

PO Box 4000 | 44865 Loudoun Water Way | Ashburn, VA 20146  
TEL 571.291.7700 | FAX 571.223.2910

January 16, 2013

Ms. Alison Thompson  
Water Permits Technical Reviewer  
Virginia Department of Environmental Quality  
Northern Regional Office  
13901 Crown Ct.  
Woodbridge, VA 22193

RE: Potomac Water Supply Program  
Loudoun Water Treatment Plant VPDES Individual Permit Application

Dear Ms. Thompson:

Loudoun Water is in the design phase of a project to construct a 20-MGD water treatment plant located on a 50-acre parcel adjacent to the west bank of Goose Creek and on the north side of the Dulles Greenway. The proposed Loudoun Water Treatment Plant (LWTP) will provide a reliable supply of potable drinking water to Loudoun Water's service area based on current demand and future population growth projections. While the LWTP will be designed to recycle most of its process wastewater, infrequent external discharge will be required during activities such as leak testing and plant start-up, as well as during emergency overflow events. Therefore, Loudoun Water is submitting a Virginia Department of Environmental Quality (DEQ) Virginia Pollutant Discharge Elimination System (VPDES) individual permit application for the proposed LWTP.

The attached permit application consists of the following completed forms:

EPA Form 1 – General Information

EPA Form 2D – New Sources and New Dischargers: Application for Permit to Discharge Process Wastewater


VPDES Permit Application Addendum

DEQ Permit Application Fee Form

Local Government Ordinance Form

Public Notice Billing Information Form

The Local Government Ordinance Form was sent to Loudoun County on January 17, 2013. Copies were sent to both the Loudoun County Administrator and the Director of the Department



of Building and Development. Once Loudoun County returns the completed form, it will be submitted to DEQ. Additionally, the original permit fee check was mailed directly to DEQ – Receipts Control. A copy of the check accompanies the copy of the Permit Application Fee Form.

In order to assist with your evaluation of the LWTP facility, two facility description narratives are also included with the permit application forms. The first facility description (**Appendix A**) details facility location, the nature of the VPDES discharge, outfall location, and characteristics of the receiving water. It is accompanied by several attachments which are provided to promote greater understanding and satisfy several form requirements. These attachments include:

Attachment A – Select Site Plan Sheets

Attachment B – Proposed and Alternate VPDES Outfall Locations

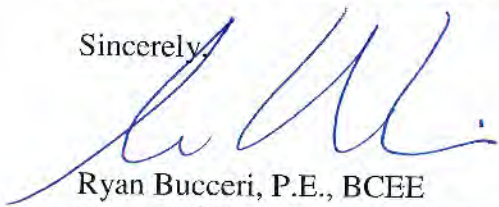
Attachment C – Receiving Water Photographs and Hydraulic Model Summary Report

The second facility description details plant processes and is provided as **Appendix B**.

Plant discharges will be piped to the VPDES outfall location on the east side of the plant. From the outfall, the discharge will travel approximately 700 feet via an un-named tributary to Goose Creek. This un-named tributary consists of an ephemeral stream channel and emergent wetlands that will naturally filter the already treated discharge before it enters Goose Creek. Since Goose Creek is a public water supply, the Virginia Department of Health (VDH) and the City of Fairfax have been consulted throughout the design and permitting process.

If any clarification or further information is needed to assist in your review or the writing of the permit, please contact me at (571) 291-7981.

Sincerely,



Ryan Bucceri, P.E., BCEE  
Potomac Water Supply Program Manager  
Loudoun Water

cc: Bill Dowbiggin (CDM Smith)  
Matt Petty (CDM Smith)  
Nicolle Boulay (Loudoun Water)





# Loudoun Water Treatment Plant VPDES Individual Permit Application

January 2013



[WWW.LOUDOUNWATER.ORG](http://WWW.LOUDOUNWATER.ORG)

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Permits Division

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# **Application Form 1 – General Information**

## **Consolidated Permits Program**

This form must be completed by all persons applying for a permit under EPA's Consolidated Permits Program. See the general instructions to Form 1 to determine which other application forms you will need.

FORM <b>1</b> GENERAL	U.S. ENVIRONMENTAL PROTECTION AGENCY <b>GENERAL INFORMATION</b> <i>Consolidated Permits Program</i> <i>(Read the "General Instructions" before starting.)</i>	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="5">I. EPA I.D. NUMBER</th> </tr> <tr> <td style="width:10%;">S</td> <td style="width:70%;"></td> <td style="width:10%;">T/A</td> <td style="width:10%;">C</td> <td style="width:10%;"></td> </tr> <tr> <td>F</td> <td></td> <td></td> <td>D</td> <td></td> </tr> <tr> <td>1</td> <td>2</td> <td>13</td> <td>14</td> <td>15</td> </tr> </table>	I. EPA I.D. NUMBER					S		T/A	C		F			D		1	2	13	14	15																																																																										
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VII. SIC CODES (4-digit, in order of priority)											
A. FIRST					B. SECOND						
C					(specify)	Water Supply	C				(specify)
7	4	9	4	1			7				
15	16		18	19			15	16		18	19
C. THIRD					D. FOURTH						
C					(specify)		C				(specify)
7							7				
15	16		18	19			15	16		18	19

		A. NAME	B. Is the name listed in Item VII-A also the owner?
8		Loudoun Water	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
15	15		

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box: if "Other," specify.)										D. PHONE (area code & no.)																																									
F = FEDERAL S = STATE P = PRIVATE					M = PUBLIC (other than federal or state) O = OTHER (specify)					M (specify)					<table border="1"> <tr> <td>e</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>A</td><td>(571)</td><td>291</td><td>-</td><td>7700</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>					e																A	(571)	291	-	7700											
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15	8	-	18	18	-	21	22	-	26																																										

E. STREET OR P.O. BOX	
44865 Loudoun Water Way, P.O. Box 4000	

F. CITY OR TOWN																																								G. STATE				H. ZIP CODE				I. INDIAN LAND			
Ashburn																																								VA				20146				Is the facility located on Indian lands?			
																																																<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			

A. NPDES (Discharges to Surface Water)															D. PSD (Air Emissions from Proposed Sources)																													
C	T	I													C	T	I																											
9	N														9	P																												
15	16	17	18	30												15	16	17	18	30																								
B. UIC (Underground Injection of Fluids)															E. OTHER (specify)															(specify) U.S. Army Corps of Engineers Department of the Army Permit (CWA - Section 404 and Virginia JPA Permit)														
C	T	I													C	T	I	2010-1844																										
9	U														9																													
15	16	17	18	30												15	16	17	18	30																								
C. RCRA (Hazardous Wastes)															E. OTHER (specify)															(specify) Virginia DEQ Water Protection Permit (CWA - Section 404 and Virginia JPA Permit)														
C	T	I													C	T	I	10-2020																										
9	R														9																													
15	16	17	18	30												15	16	17	18	30																								


Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers, and other surface water bodies in the map area. See instructions for precise requirements.

The proposed Loudoun Water Treatment Plant (LWTP) will provide a reliable source of potable drinking water to residents within Loudoun Water's service area. The plant will start up at a rated capacity of 20 mgd (net capacity for finished water pumped to the distribution system). Beneficial use of the LWTP is estimated to occur in June 2016. Plant capacity will eventually be increased incrementally to meet future demands, either through expansion to 40 mgd (net), or through uprating to 25 or 30 mgd with expansion to 40 mgd deferred to a future date.

The LWTP design calls for continuous discharges of process wastewater of up to 1.0 mgd with intermittent discharges during plant start-up of up to 4.0 mgd. Discharges will be piped to a single outfall location (001) on the east side of the site. Discharges will be conveyed approximately 1,000 feet by an un-named, ephemeral tributary before entering Goose Creek.

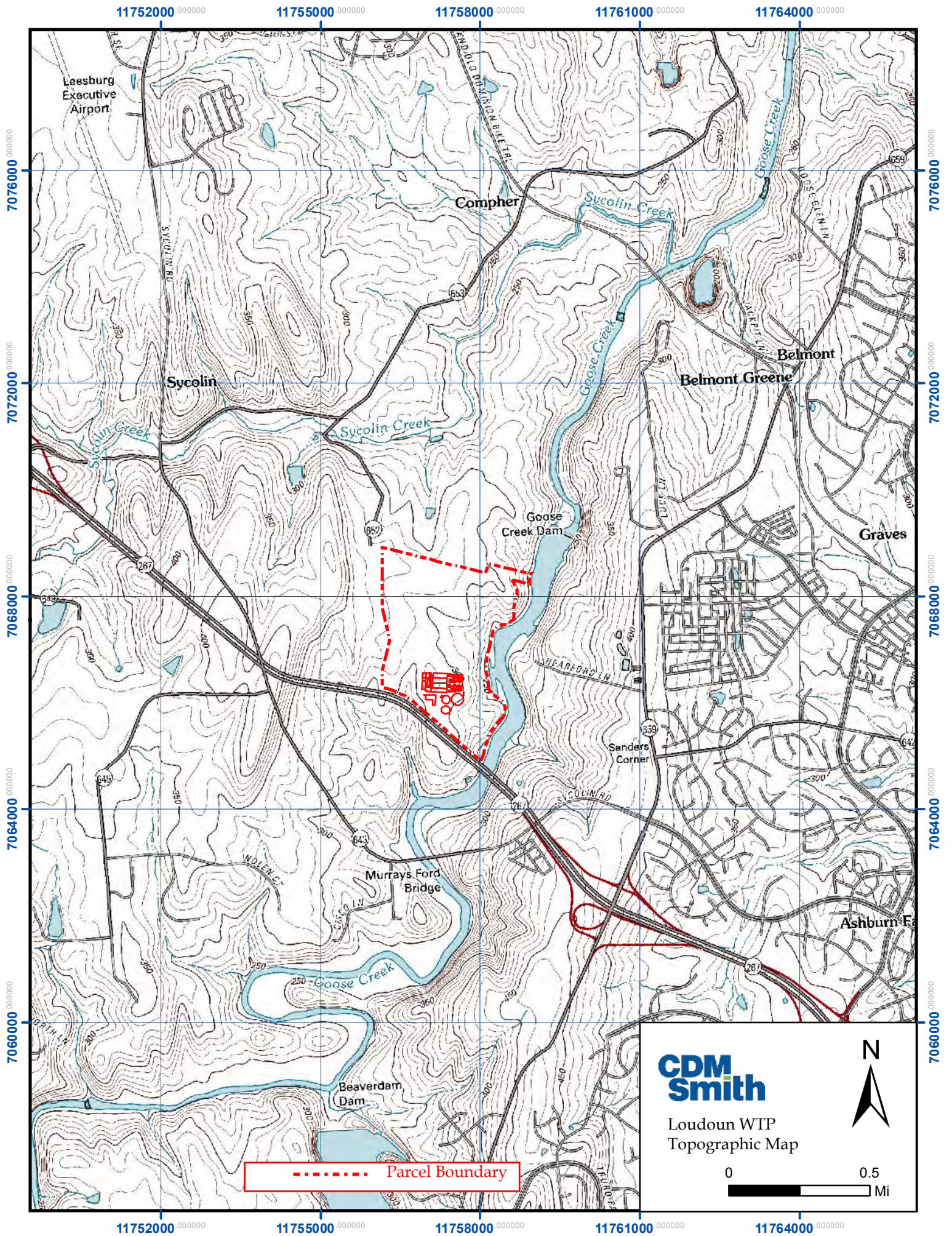
Additional details regarding plant location, plant processes, nature of effluent, and outfall location are provided in the attached "Facility Description" narratives (Appendix A and Appendix B).

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

<p>A. NAME &amp; OFFICIAL TITLE <i>(type or print)</i>          Ryan Bucceri, Potomac Water Supply          Program (PWSP) Manager</p>	<p>B. SIGNATURE  </p>	<p>C. DATE SIGNED          1/16/13</p>
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[illegible]





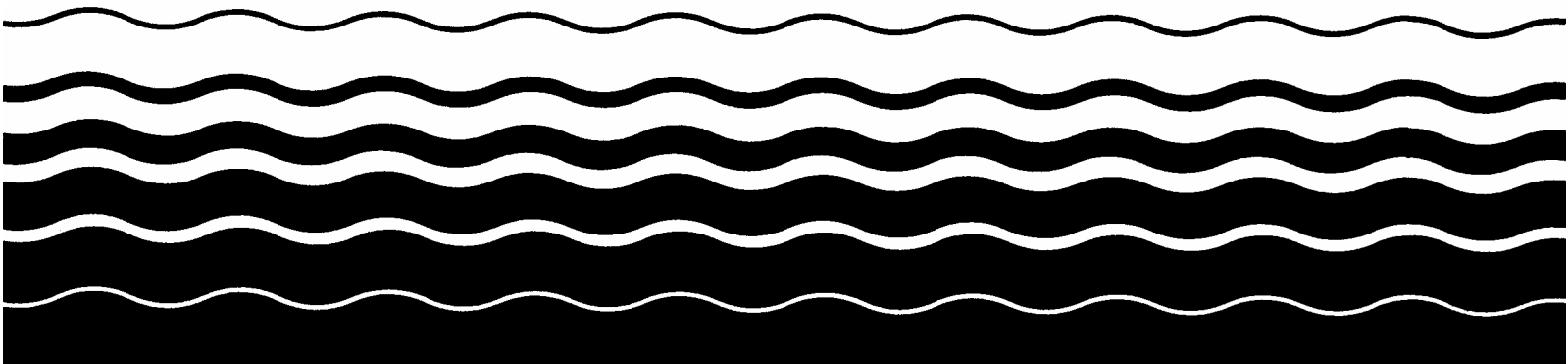





# **Application Form 2D —**

## **New Sources and New Dischargers:**

### **Application for Permit to Discharge Process Wastewater**



Form <b>2D</b> NPDES		<b>New Sources and New Dischargers</b> <b>Application for Permit to Discharge Process Wastewater</b>
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I. Outfall Location	
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Outfall Number (list)	Latitude			Longitude			Receiving Water ( <i>name</i> )
	Deg.	Min.	Sec.	Deg.	Min.	Sec.	
001	39	02	52	77	32	0	Un-named, ephemeral tributary of Goose Creek

<b>II. Discharge Date</b> (When do you expect to begin discharging?) 09/01/2014
--

### III. Flows, Sources of Pollution, and Treatment Technologies

A. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

[illegible]



B. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item III-A. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g., for certain mining activities), provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures.

C. Except for storm runoff, leaks, or spills, will any of the discharges described in Items III-A be intermittent or seasonal?

☒ YES (complete the following table)

☐ NO (go to Section IV)

Outfall Number	1. Frequency		2. Flow		
	a. Days Per Week (specify average)	b. Months Per Year (specify average)	a. Maximum Daily Flow Rate (in mgd)	b. Maximum Total Volume (specify with units)	c. Duration (in days)
001 - Intermittent discharges only expected during leak testing and plant start-up	< 1.0	< 0.5	4.0		

#### IV. Production

If there is an applicable production-based effluent guideline or NSPS, for each outfall list the estimated level of production (projection of actual production level, not design), expressed in the terms and units used in the applicable effluent guideline or NSPS, for each of the first 3 years of operation. If production is likely to vary, you may also submit alternative estimates (attach a separate sheet).

Year	A. Quantity Per Day	B. Units Of Measure	c. Operation, Product, Material, etc. (specify)
2016	20	MGD	Potable Drinking Water
2017	20	MGD	Potable Drinking Water
2018	20	MGD	Potable Drinking Water





CONTINUED FROM THE FRONT		EPA I.D. NUMBER (copy from Item 1 of Form 1)	
C. Use the space below to list any of the pollutants listed in Table 2D-3 of the instructions which you know or have reason to believe will be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it will be present.			
1. Pollutant		2. Reason for Discharge	
No pollutants listed in Table 2D-3 would be discharged from any outfall			
<b>VI. Engineering Report on Wastewater Treatment</b>			
A. If there is any technical evaluation concerning your wastewater treatment, including engineering reports or pilot plant studies, check the appropriate box below. <input checked="" type="checkbox"/> Report Available <input type="checkbox"/> No Report			
B. Provide the name and location of any existing plant(s) which, to the best of your knowledge resembles this production facility with respect to production processes, wastewater constituents, or wastewater treatments.			
Name James J. Corbalis Jr. Water Treatment Plant		Location 1295 Fred Morin Drive, Herndon, VA 20170	

**VII. Other Information (Optional)**

Use the space below to expand upon any of the above questions or to bring to the attention of the reviewer any other information you feel should be considered in establishing permit limitations for the proposed facility. Attach additional sheets if necessary.

The Loudoun Water Treatment Plant (LWTP) is designed to recycle its process water. However, plant operators would like the option to send small, continuous process water discharges that are unable to be recycled through the permitted outfall. These discharges would consist of flows less than 1.0 mgd. The permitted outfall would also convey larger, intermittent discharges of up to 4.0 mgd that could be present due to leak testing during construction, plant start-up, and emergency overflow situations.

Additional Information regarding plant location, plant processes, effluent characteristics, and outfall location is provided in the attached "Facility Description" narratives (Appendix A and Appendix B).

**VIII. CERTIFICATION**

*I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*

A. Name and Official Title (type or print)

Ryan Bucceri, Potomac Water Supply Program (PWSP) Manager

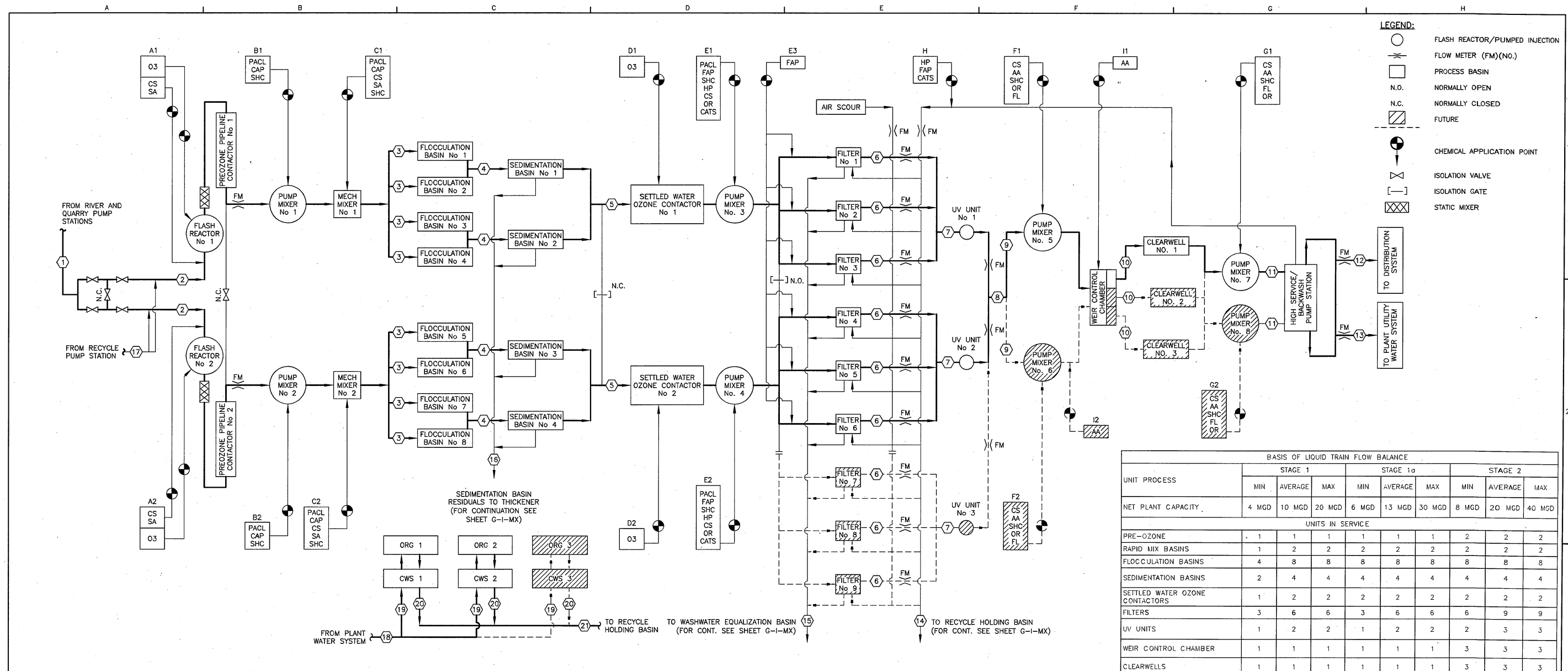
B. Phone No.

(571) 291-7981

C. Signature

D. Date Signed

1/16/13



- LEGEND:**
- FLASH REACTOR/PUMPED INJECTION
  - FM FLOW METER (FM)(NO.)
  - PROCESS BASIN
  - N.O. NORMALLY OPEN
  - N.C. NORMALLY CLOSED
  - ▨ FUTURE
  - CHEMICAL APPLICATION POINT
  - ⌵ ISOLATION VALVE
  - [ ] ISOLATION GATE
  - ⊗ STATIC MIXER

UNIT PROCESS	BASIS OF LIQUID TRAIN FLOW BALANCE								
	STAGE 1			STAGE 1a			STAGE 2		
	MIN	AVERAGE	MAX	MIN	AVERAGE	MAX	MIN	AVERAGE	MAX
NET PLANT CAPACITY	4 MGD	10 MGD	20 MGD	6 MGD	13 MGD	30 MGD	8 MGD	20 MGD	40 MGD
UNITS IN SERVICE									
PRE-OZONE	1	1	1	1	1	1	2	2	2
RAPID MIX BASINS	1	2	2	2	2	2	2	2	2
FLOCCULATION BASINS	4	8	8	8	8	8	8	8	8
SEDIMENTATION BASINS	2	4	4	4	4	4	4	4	4
SETTLED WATER OZONE CONTACTORS	1	2	2	2	2	2	2	2	2
FILTERS	3	6	6	3	6	6	6	9	9
UV UNITS	1	2	2	1	2	2	2	3	3
WEIR CONTROL CHAMBER	1	1	1	1	1	1	3	3	3
CLEARWELLS	1	1	1	1	1	1	3	3	3

SYSTEM IDENTIFICATION & PROCESS STREAM DESCRIPTION		①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭ (NOTES 2&3)	⑮ (NOTES 2&3)	⑯ (NOTES 2,3,5,&6)	⑰ (NOTES 2&3)	⑱ (NOTE 4)	⑲ (NOTE 4)	⑳ (NOTE 4)	㉑ (NOTE 4)
		RAW WATER				SETTLED WATER	FILTERED WATER	COMBINED FILTER EFFLUENT				FINISHED WATER			FILTER TO WASTE	BACKWASH WASTE	SLUDGE	RAW WATER	PLANT WATER			
		RIVER AND QUARRY PUMP STATION FLOW	PLANT INFLUENT FLOW	FLOCCULATION BASIN INFLUENT FLOW	SEDIMENTATION BASIN INFLUENT FLOW	SECONDARY OZONE FLOW	FILTER EFFLUENT FLOW	UV SYSTEM FLOW	COMBINED PLANT EFFLUENT FLOW	WEIR CONTROL CHAMBER INFLUENT FLOW	CLEARWELL INFLUENT FLOW	HIGH SERVICE PUMP STATION INFLUENT FLOW	DISTRIBUTION SYSTEM FLOW	PLANT UTILITY WATER SYSTEM FLOW	RECYCLE BASIN INFLUENT FLOW	WASHWATER BASIN INFLUENT FLOW	SLUDGE FLOW TO THICKENERS	RECYCLE PUMP DISCHARGE FLOW	OZONE GENERATOR COOLING SYSTEM SUPPLY FLOW	INDIVIDUAL COOLING SYSTEM SUPPLY FLOW	INDIVIDUAL COOLING SYSTEM RETURN FLOW	OZONE GENERATOR COOLING SYSTEM RETURN FLOW TO RECYCLE HOLDING BASIN
STAGE 1 FLOWS (MGD)	MAX	20.0	10.6	2.6	5.3	10.5	3.4	10.1	20.3	20.3	20.3	20.3	20.0	0.3	0.10	0.6	0.12	1.1	0.3	0.3	0.3	0.3
	AVERAGE	10.0	5.3	1.3	2.7	5.3	1.7	5.1	10.2	10.2	10.2	10.2	10.0	0.2	0.05	0.3	0.06	0.6	0.2	0.2	0.2	0.2
	MIN	4.0	4.3	1.1	2.2	4.3	1.4	4.1	4.1	4.1	4.1	4.1	4.0	0.1	0.02	0.1	0.02	0.3	0.1	0.1	0.1	0.1
STAGE 1A FLOWS (MGD)	MAX	30.0	15.8	4.0	7.9	15.7	5.1	15.2	30.4	30.4	30.4	30.4	30.0	0.4	0.15	0.9	0.17	1.7	0.4	0.2	0.2	0.4
	AVERAGE	13.0	6.9	1.7	3.5	6.9	2.2	6.7	13.4	13.4	13.4	13.4	13.0	0.4	0.07	0.4	0.08	0.9	0.4	0.2	0.2	0.4
	MIN	6.0	3.3	0.8	1.6	3.2	2.1	6.3	6.3	6.3	6.3	6.3	6.0	0.3	0.03	0.2	0.04	0.5	0.3	0.1	0.1	0.3
STAGE 2 FLOWS (MGD)	MAX	40.0	21.1	5.3	10.6	21.0	4.5	13.5	40.6	20.3	13.5	20.3	40.0	0.6	0.20	1.2	0.23	2.2	0.6	0.3	0.3	0.6
	AVERAGE	20.0	10.6	2.7	5.3	10.6	2.3	6.8	20.4	10.2	6.8	10.2	20.0	0.4	0.10	0.6	0.12	1.3	0.4	0.2	0.2	0.4
	MIN	8.0	4.3	1.1	2.2	4.3	1.4	4.1	8.3	4.1	2.8	4.1	8.0	0.3	0.04	0.2	0.05	0.6	0.3	0.1	0.1	0.3

**NOTES:**

- FLASH REACTOR AND PUMP MIXERS RECYCLE PROCESS WATER SIDE STREAM FLOWS IN A CLOSED LOOP FOR CHEMICAL MIXING WITH NO CHANGES TO PLANT FLOW BALANCE.
- FILTER BACKWASH, FILTER TO WASTE, AND RECYCLE PUMP STATION DISCHARGE ARE INTERMITTENT FLOWS. AVERAGE DAILY FLOW RATES FOR THESE PROCESS STREAMS HAVE BEEN USED IN THE FLOW BALANCE.
- FILTER BACKWASH, FILTER TO WASTE, AND SLUDGE FLOWS ARE ESTIMATED AS A PERCENTAGE OF PLANT PRODUCTION FLOW BASED UPON NORMAL OPERATING CONDITIONS FOR A CONVENTIONAL TREATMENT PLANT. PERCENTAGES USED FOR FLOW ESTIMATES ARE AS FOLLOWS:  
FILTER BACKWASH = 3.0%  
FILTER TO WASTE = 0.5%  
SLUDGE = 0.6%
- MAXIMUM ALLOWABLE OZONE GENERATOR COOLING WATER FLOW IS 200 GPM PER GENERATOR AT DESIGN CONDITIONS, WITH MODULATED FLOWS AT LOWER PLANT PRODUCTION RATES.
- DRY SOLIDS PRODUCTION IS ESTIMATED AS 160 DRY LBS OF SOLIDS PRODUCED PER MILLION GALLONS (LB/MG) OF PLANT INFLUENT FLOW. THE 160 DRY LB/MG SOLID PRODUCTION RATE IS BASED ON PROJECTED AVERAGE DAY CONDITIONS.
- SEDIMENTATION BASIN AND PLATE SETTLER BLOW DOWN SOLIDS CONCENTRATION IS ASSUMED TO BE 0.3% SOLIDS.
- CHEMICAL ABBREVIATIONS:  
AA = AQUEOUS AMMONIA  
CAP = COAGULANT AID POLYMER  
CS = CAUSTIC SODA (SODIUM HYDROXIDE)  
CATS = CALCIUM THIOSULFATE  
FAP = FILTER AID POLYMER  
FL = FLUORIDE (HYDROFLUOSILICIC ACID OR SILICOFUORIDE)  
HP = HYDROGEN PEROXIDE  
O3 = OZONE  
OR = ORTHOPHOSPHATE  
PACL = POLYALUMINUM CHLORIDE  
PP = POTASSIUM PERMANGANATE  
SA = SULFURIC ACID  
SHC = SODIUM HYPOCHLORITE  
CL2 = CHLORINE

REV. NO. DATE DRWN BY CHKD BY REMARKS

DESIGNED BY: C. SCHULZ  
DRAWN BY: C. STILLWELL  
CHECKED BY: XXX  
APPROVED BY: XXX  
DATE: JUNE 2013

SCALE NOTE  
SCALE BAR SHOWN BELOW IS ONE INCH LONG ON A FULL SIZE DRAWING. WHEN SCALING DRAWINGS, MEASURE BAR TO DETERMINE IF SCALES SHOWN WILL REQUIRE ADJUSTING.

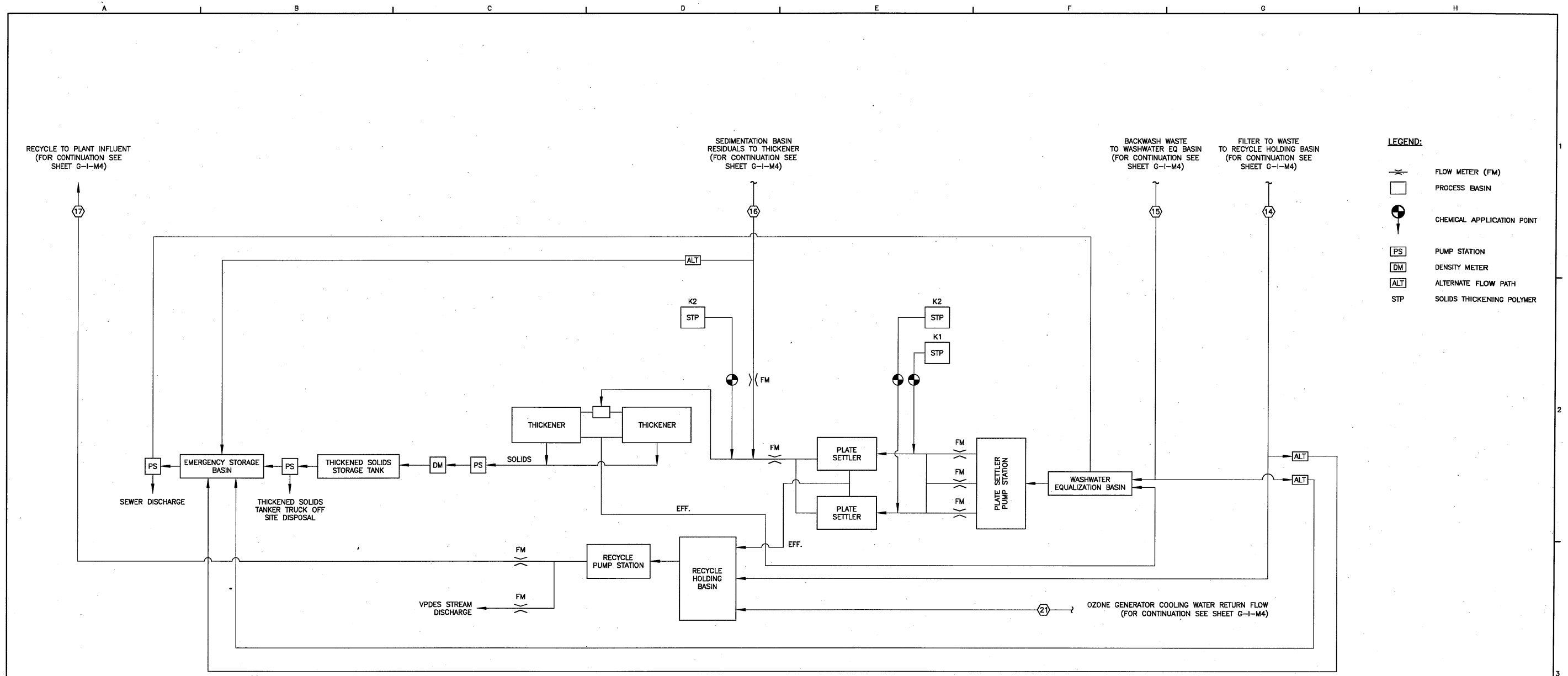
0 1/2" 1"

3201 Jermentown Road, Suite 400  
Fairfax, VA 22030  
Tel: (703) 691-6500

LOUDOUN WATER  
POTOMAC WATER SUPPLY PROGRAM  
PROGRAM ELEMENT NO. 5 & 6  
WATER TREATMENT PLANT & FINISHED  
WATER TRANSMISSION - PHASE I

GENERAL  
MECHANICAL  
PROCESS SCHEMATIC  
LIQUIDS FLOW BALANCE

PROJECT NO. 1378-91669  
FILE NAME: G003PRD1  
DRAWING NO. G-I-M4  
SHEET XXX OF XXX



SYSTEM IDENTIFICATION & PROCESS STREAM DESCRIPTION		(14) (NOTES 2&3)	(15) (NOTES 2&3)	(16) (NOTES 2,3,5,&6)	(17) (NOTES 2&3)	(21) (NOTE 4)
		FILTER TO WASTE	BACKWASH WASTE	SLUDGE	RAW WATER	PLANT WATER
		RECYCLE BASIN INFLUENT FLOW	WASHWATER BASIN INFLUENT FLOW	SLUDGE FLOW TO THICKENERS	RECYCLE PUMP STATION DISCHARGE FLOW	OZONE GENERATOR COOLING SYSTEM RETURN FLOW TO RECYCLE HOLDING BASIN
STAGE 1 FLOWS (MGD)	MAX	0.10	0.6	0.12	1.1	0.3
	AVERAGE	0.05	0.3	0.06	0.6	0.2
	MIN	0.02	0.1	0.02	0.3	0.1
STAGE 1A FLOWS (MGD)	MAX	0.15	0.9	0.17	1.7	0.4
	AVERAGE	0.07	0.4	0.08	0.9	0.4
	MIN	0.03	0.2	0.04	0.5	0.3
STAGE 2 FLOWS (MGD)	MAX	0.20	1.2	0.23	2.2	0.6
	AVERAGE	0.10	0.6	0.12	1.3	0.4
	MIN	0.04	0.2	0.05	0.6	0.3

- NOTES:**
1. FILTER BACKWASH, FILTER TO WASTE, SLUDGE, AND RECYCLE PUMP STATION DISCHARGE ARE INTERMITTENT FLOWS. AVERAGE DAILY FLOW RATES FOR THESE PROCESS STREAMS HAVE BEEN USED IN THE FLOW BALANCE.
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  3. MAXIMUM ALLOWABLE OZONE GENERATOR COOLING WATER FLOW IS 200 GPM PER GENERATOR AT DESIGN CONDITIONS, WITH MODULATED FLOWS AT LOWER PLANT PRODUCTION RATES.
  4. DRY SOLIDS PRODUCTION IS ESTIMATED AS 160 DRY LBS OF SOLIDS PRODUCED PER MILLION GALLONS (LB/MG) OF PLANT INFLUENT FLOW. THE 160 DRY LB/MG SOLID PRODUCTION RATE IS BASED ON PROJECTED AVERAGE DAY CONDITIONS.
  5. SEDIMENTATION BASIN AND PLATE SETTLER BLOW DOWN SOLIDS CONCENTRATION IS ASSUMED TO BE 0.3% SOLIDS.

DESIGNED BY:	R. MUTTER
DRAWN BY:	C. STILLWELL
CHECKED BY:	XXX
APPROVED BY:	XXX
DATE:	JUNE 2013

POTOMAC  
WATER SUPPLY PROGRAM

**SCALE NOTE**  
SCALE BAR SHOWN BELOW IS ONE INCH LONG ON A FULL SIZE DRAWING. WHEN SCALING DRAWINGS, MEASURE BAR TO DETERMINE IF SCALES SHOWN WILL REQUIRE ADJUSTING.

**CDM Smith**  
3201 Jermantown Road, Suite 400  
Fairfax, VA 22030  
Tel: (703) 691-6500

LOUDOUN WATER  
POTOMAC WATER SUPPLY PROGRAM  
PROGRAM ELEMENT NO. 5 & 6  
WATER TREATMENT PLANT & FINISHED  
WATER TRANSMISSION - PHASE I

GENERAL  
MECHANICAL  
PROCESS SCHEMATIC  
SOLIDS FLOW BALANCE

PROJECT NO.	1378-91669
FILE NAME:	G004PRD1
DRAWING NO.	G-1-M5
SHEET	XXX OF XXX

REV.	NO.	DATE	DRWN BY	CHKD BY	REMARKS

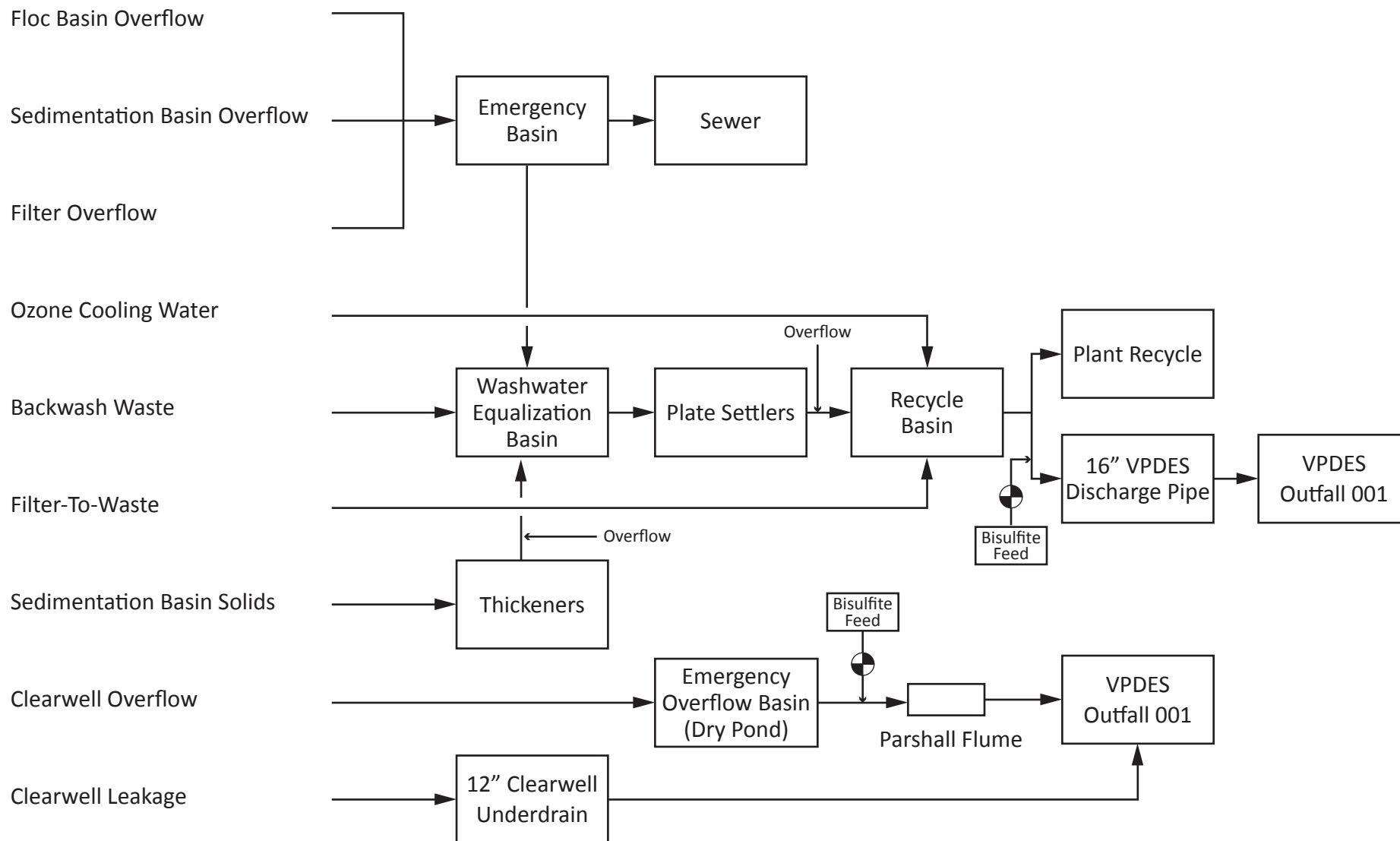
60% DESIGN - NOT FOR CONSTRUCTION

12



## VPDES Process Flow Schematic

### Flow Sources



## VPDES Permit Application Addendum

1. **Entity to whom the permit is to be issued:** Loudoun Water

*Who will be legally responsible for the wastewater treatment facilities and compliance with the permit? This may or may not be the facility or property owner.*

2. **Is this facility located within city or town boundaries?** Yes ☐ No ☒

3. **Provide the tax map parcel number for the land where the discharge is located.** 153-35-5865

4. **For the facility to be covered by this permit, how many acres will be disturbed during the next five years due to new construction activities?** 12 acres

5. **What is the design average effluent flow of this facility?** < 1.0 MGD

**For industrial facilities, provide the max. 30-day average production level, include units:**

Continuous discharges from process wastewater will average < 1.0 MGD

**In addition to the design flow or production level, should the permit be written with limits for any other discharge flow tiers or production levels?** Yes ☒ No ☐

If "Yes", please identify the other flow tiers (in MGD) or production levels:

Intermittent discharges of up to 4.0 MGD are possible during testing, plant start-up, and emergency situations

*Please consider the following questions for both the flow tiers and the production levels (if applicable): Do you plan to expand operations during the next five years? Is your facility's design flow considerably greater than your current flow?*

6. **Nature of operations generating wastewater:**

Testing during plant construction, start-up activities, and process wastewater from treatment of potable drinking water

0 % of flow from domestic connections/sources

Number of private residences to be served by the treatment works: N/A

100 % of flow from non-domestic connections/sources

7. **Mode of discharge:** ☒ Continuous ☒ Intermittent ☐ Seasonal

Describe frequency and duration of intermittent or seasonal discharges:

Small discharges up to 4.0 MGD are expected during plant start-up but may also occur with plant testing during construction and emergency overflow situations

8. **Identify the characteristics of the receiving stream at the point just above the facility's discharge point:**

Permanent stream, never dry

Intermittent stream, usually flowing, sometimes dry

X Ephemeral stream, wet-weather flow, often dry

Effluent-dependent stream, usually or always dry without effluent flow

Lake or pond at or below the discharge point

Other:

9. **Approval Date(s):**

**O & M Manual** To be developed during construction

**Sludge/Solids Management Plan** To be developed during construction

Have there been any changes in your operations or procedures since the above approval dates? Yes ☐ No ☐

### REDACTED DOCUMENT NOTIFICATION

Pursuant to §2.2-3705.1 and §2.2-3801, certain personal information is not subject to FOIA. The following information was removed from these records:

- ☐ Social Security Number(s)
- ☒ Financial information such as: account numbers or routing numbers for any credit card, debit or check
- ☐ Personal identification numbers such as: driver's license, student numbers, or agency-issued numbers
- ☐ Tax return information
- ☐ Other personal information such as: education, medical history, ancestry, religion, political ideology, criminal or employment record
- ☐ E-mail address for an individual who requested that it not be released

Pursuant to (Check one): ☒ § 62.1-44.21 (Water), ☐ §§ 10.1-1314 and 1314.1 (Air), and ☐ §§ 10.1-1314 and 1314.1 (Pollution Prevention) of the Virginia Code, certain confidential business information is not subject to disclosure requirements. The following information was removed from these records:

- ☐ Secret formulae, secret processes, or secret methods.

Pursuant to 2.2-3705.1 et seq. of the Virginia Code, records containing information on the site specific location of rare, threatened, endangered or otherwise imperiled plant and animal species, natural communities, caves, and significant historic and archaeological sites are not subject to the Freedom of Information Act (FOIA). The following information was removed from these records:

- ☐ Site specific location of rare, threatened, or otherwise imperiled plant and animal species, natural communities, and/or caves
- ☐ Site specific location of significant historic and/or archaeological sites
- ☐ Other \_\_\_\_\_

Please feel free to contact the FOIA Coordinator for the DEQ Northern Regional Office if you have any questions or wish to discuss your request in further detail.

DEQ-NRO FOIA Coordinator:

Tracey Buchannan, Office Manager  
13901 Crown Court  
Woodbridge, VA 23193  
(703) 583-3815  
tracey.buchannan@deq.virginia.gov

January 16, 2013

Mr. Tim Hemstreet  
Loudoun County Administrator  
1 Harrison Street SE  
Leesburg, VA 20175

RE: Potomac Water Supply Program  
Loudoun Water Treatment Plant VPDES Permit Application – Local Government  
Ordinance Form

Dear Mr. Hemstreet:

Loudoun Water is in the design phase of a project to construct a 20-MGD water treatment plant located on a 50-acre parcel adjacent to the west bank of Goose Creek and on the north side of the Dulles Greenway. The proposed Loudoun Water Treatment Plant (LWTP) will provide a reliable supply of potable drinking water to Loudoun Water's service area based on current demand and future population growth projections. While the LWTP will be designed to recycle most of its process wastewater, infrequent external discharge will be required during activities such as leak testing and plant start-up, as well as during emergency overflow events. Therefore, Loudoun Water is preparing a Virginia Department of Environmental Quality (DEQ) Virginia Pollutant Discharge Elimination System (VPDES) permit application for the proposed LWTP.

Treatment processes have been put in place to ensure that the VPDES discharge meets DEQ water quality standards for pH, total suspended solids (TSS), total residual chlorine, and other pollutants that could be present. The discharge will be piped to the VPDES outfall location on the east side of the plant. From the outfall, the discharge will travel approximately 700 feet via an un-named tributary to Goose Creek. This un-named tributary consists of an ephemeral stream channel and emergent wetlands that will naturally filter the already treated discharge before it enters Goose Creek. Since Goose Creek is a public water supply, the Virginia Department of Health (VDH) and the City of Fairfax have been consulted throughout the design and permitting process.

In order for DEQ to consider a VPDES permit application for a new discharge complete, the county, city, or town in which the discharge is to take place must be notified. In addition, Loudoun County must certify that the location and operation of the LWTP is consistent with applicable local ordinances pursuant to Chapter 22 (§ 15.2-2200 et seq.) of Title 15.2, Code of Virginia.



In order to assist with your determination, two facility descriptions have been provided (Appendix A and Appendix B). These facility descriptions detail the facility location, facility processes, discharge characteristics, and outfall location. Once a determination has been made, please fill out the appropriate sections at the end of the attached Local Government Ordinance Form. DEQ requests that the form be completed within 30 days of receipt.

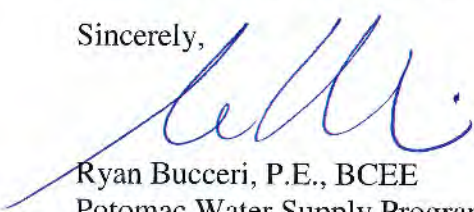
Completed forms may be returned to:

Matt Petty  
CDM Smith  
3201 Jermantown Road, Suite 400  
Fairfax, VA 22030

The site plan for the LWTP project has recently been submitted to Loudoun County and is currently under review. Therefore, I have also sent a copy of the Local Government Ordinance Form to Terry Wharton, Director of Building & Development. While it is ultimately your signature that is required, please feel free to coordinate with Building & Development concerning review and completion of the Ordinance Form.

I greatly appreciate your input on this matter, and if any further information is needed, please contact me at (571) 291-7981.

Sincerely,



Ryan Bucceri, P.E., BCEE  
Potomac Water Supply Program Manager  
Loudoun Water

cc: Bill Dowbiggin (CDM Smith)  
Matt Petty (CDM Smith)  
Nicolle Boulay (Loudoun Water)



**Local Government Ordinance Form**

SUBJECT: Local and Areawide Planning Requirements

TO: Applicants For A Virginia Pollutant Discharge Elimination System Permit

§62.1-44.15:3 A of the State Water Control Law states:

*"No application for a new individual VPDES permit authorizing a new discharge of sewage, industrial wastes, or other wastes shall be considered complete unless it contains notification from the county, city, or town in which the discharge is to take place that the location and operation of the discharging facility are consistent with applicable ordinances adopted pursuant to Chapter 22 (§ 15.2-2200 et seq.) of Title 15.2, Code of Virginia. The county, city or town shall inform in writing the applicant and the Board of the discharging facility's compliance or noncompliance not more than thirty days from receipt by the chief administrative officer, or his agent, of a request from the applicant. Should the county, city or town fail to provide such written notification within thirty days, the requirement for such notification is waived. The provisions of this subsection shall not apply to any discharge for which a valid VPDES permit had been issued prior to March 10, 2000."*

In accordance with this section, applications for a new VPDES permit will not be considered complete until the certification statement is submitted to the Department of Environmental Quality Regional Office. Applicants may use the bottom of this page to transmit the request to the locality. If the locality does not respond to your request within 30 days, submit a copy of this form, showing the date you made the request, with your permit application.

\*\*\*\*\*

To: Tim Hemstreet, Loudoun County Administrator  
(County, City, or Town Administrator/Manager)

Date: 1/16/13

I am in the process of completing an application for a new VPDES permit. In accordance with Chapter 22 (§15.2-2200 et seq.) of Title 15.2 of the Code, I request that you sign one of the three statements certifying that the operation described on the attached permit application is or is not consistent with your local ordinances. Please return this form to me at:

(Applicant's address) : 44865 Loudoun Water Way  
P.O. Box 4000  
Ashburn, VA 20146

**PLEASE SEE THE REVERSE SIDE OF FORM FOR CERTIFICATION REQUIREMENTS**

**LOCAL GOVERNMENT ORDINANCE FORM**

**For new VPDES permit applications**

In reference to the request from: Loudoun Water  
Applicant's Name

For certification of a discharge at:  
Loudoun Water Treatment Plant  
Name and Location of Facility

I hereby certify,

\_\_\_ (1) That the proposed location, and operation of the facility is consistent with all ordinances adopted pursuant to Chapter 22 (§15.2-2200 et seq.) of Title 15.2 of the Code of Virginia

OR

\_\_\_ (2) That no local ordinances are in effect pursuant to Chapter 22 (§15.2-2200 et seq.) of Title 15.2 of the Code of Virginia

OR

\_\_\_ (3) That the proposed location and operation of the facility is **not** consistent with all ordinances adopted pursuant to Chapter 22 (§15.2-2200 et seq.) of Title 15.2 of the Code of Virginia

_____ Signature	_____ Title
_____ Printed Name	_____ Date



January 16, 2013

Mr. Terry Wharton  
Loudoun County Department of Building and Development  
1 Harrison Street SE  
Leesburg, VA 20175

RE: Potomac Water Supply Program  
Loudoun Water Treatment Plant VPDES Permit Application – Local Government  
Ordinance Form

Dear Mr. Wharton:

Loudoun Water is in the design phase of a project to construct a 20-MGD water treatment plant located on a 50-acre parcel adjacent to the west bank of Goose Creek and on the north side of the Dulles Greenway. The proposed Loudoun Water Treatment Plant (LWTP) will provide a reliable supply of potable drinking water to Loudoun Water's service area based on current demand and future population growth projections. While the LWTP will be designed to recycle most of its process wastewater, infrequent external discharge will be required during activities such as leak testing and plant start-up, as well as during emergency overflow events. Therefore, Loudoun Water is preparing a Virginia Department of Environmental Quality (DEQ) Virginia Pollutant Discharge Elimination System (VPDES) permit application for the proposed LWTP.

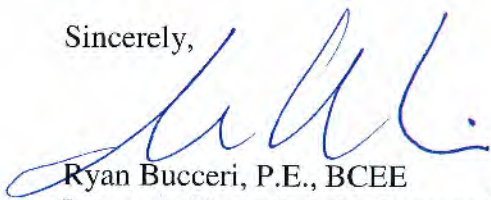
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In order for DEQ to consider a VPDES permit application for a new discharge complete, the county, city, or town in which the discharge is to take place must be notified. In addition, Loudoun County must certify that the location and operation of the LWTP is consistent with applicable local ordinances pursuant to Chapter 22 (§ 15.2-2200 et seq.) of Title 15.2, Code of Virginia.

In order to assist with your determination, two facility descriptions have been provided (Appendix A and Appendix B). These facility descriptions detail the facility location, facility processes, discharge characteristics, and outfall location. While the Local Government Ordinance Form has to be reviewed and signed by the Loudoun County Administrator, it is assumed that he will ask the Department of Building and Development for assistance in completing the review. Therefore, copies of all review materials have been sent to the offices of both the County Administrator and the Department of Building and Development. Once a determination has been made, I have asked Mr. Tim Hemstreet, Loudoun County Administrator, to fill out the appropriate sections at the end of the attached Local Government Ordinance Form. DEQ requests that the form be completed within 30 days of receipt.

If any clarification or further information is needed, please contact me at (571) 291-7981.

Sincerely,



Ryan Bucci, P.E., BCEE  
Potomac Water Supply Program Manager  
Loudoun Water

cc: Bill Dowbiggin (CDM Smith)  
Matt Petty (CDM Smith)  
Nicolle Boulay (Loudoun Water)





**Local Government Ordinance Form**

SUBJECT: Local and Areawide Planning Requirements

TO: Applicants For A Virginia Pollutant Discharge Elimination System Permit

§62.1-44.15:3 A of the State Water Control Law states:

*"No application for a new individual VPDES permit authorizing a new discharge of sewage, industrial wastes, or other wastes shall be considered complete unless it contains notification from the county, city, or town in which the discharge is to take place that the location and operation of the discharging facility are consistent with applicable ordinances adopted pursuant to Chapter 22 (§ 15.2-2200 et seq.) of Title 15.2, Code of Virginia. The county, city or town shall inform in writing the applicant and the Board of the discharging facility's compliance or noncompliance not more than thirty days from receipt by the chief administrative officer, or his agent, of a request from the applicant. Should the county, city or town fail to provide such written notification within thirty days, the requirement for such notification is waived. The provisions of this subsection shall not apply to any discharge for which a valid VPDES permit had been issued prior to March 10, 2000."*

In accordance with this section, applications for a new VPDES permit will not be considered complete until the certification statement is submitted to the Department of Environmental Quality Regional Office. Applicants may use the bottom of this page to transmit the request to the locality. If the locality does not respond to your request within 30 days, submit a copy of this form, showing the date you made the request, with your permit application.

\*\*\*\*\*

To: Terry Wharton, Director of Building + Development  
(County, City, or Town Administrator/Manager)

Date: 1/16/13

I am in the process of completing an application for a new VPDES permit. In accordance with Chapter 22 (§15.2-2200 et seq.) of Title 15.2 of the Code, I request that you sign one of the three statements certifying that the operation described on the attached permit application is or is not consistent with your local ordinances. Please return this form to me at:

(Applicant's address) : 44865 Loudoun Water Way  
P.O. Box 4000  
Ashburn, VA 20146

**PLEASE SEE THE REVERSE SIDE OF FORM FOR CERTIFICATION REQUIREMENTS**

**LOCAL GOVERNMENT ORDINANCE FORM**

**For new VPDES permit applications**

In reference to the request from: Loudoun Water  
Applicant's Name

For certification of a discharge at:

Loudoun Water Treatment Plant  
Name and Location of Facility

I hereby certify,

\_\_\_ (1) That the proposed location, and operation of the facility is consistent with all ordinances adopted pursuant to Chapter 22 (§15.2-2200 et seq.) of Title 15.2 of the Code of Virginia

OR

\_\_\_ (2) That no local ordinances are in effect pursuant to Chapter 22 (§15.2-2200 et seq.) of Title 15.2 of the Code of Virginia

OR

\_\_\_ (3) That the proposed location and operation of the facility is **not** consistent with all ordinances adopted pursuant to Chapter 22 (§15.2-2200 et seq.) of Title 15.2 of the Code of Virginia

_____ Signature	_____ Title
_____ Printed Name	_____ Date

### PUBLIC NOTICE BILLING INFORMATION

I hereby authorize the Department of Environmental Quality to have the cost of publishing a public notice billed to the Agent/Department shown below. The public notice will be published once a week for two consecutive weeks in The Loudoun Times in accordance with 9 VAC 25-31-290.C.2.

Agent/Department to be billed: Ryan Bucceri, Program Manager, Loudoun Water

Owner: Loudoun Water

Agent/Department Address: 44865 Loudoun Water Way

P.O. Box 4000

Ashburn, VA 20146

Agent's Telephone No.: 571-291-7981

Printed Name: Ryan Bucceri

Authorizing Agent – Signature: 

Date: 1/14/13

VPDES Permit No. VA00000000  
Loudoun Water Treatment Plant



## Appendix A

### Facility Description - Site Location & VPDES Discharge

# Loudoun Water Treatment Plant: Facility Description – Site Location & VPDES Discharge

## Introduction

Loudoun Water provides water services to approximately 190,000 residents and currently purchases its water supply from Fairfax Water and the City of Fairfax; the total reliable supply available from these suppliers, respectively, is 50 million gallons per day (mgd) and 3 mgd. The number of residents in Loudoun Water's service area is expected to double over the next 20 years, and water demands are projected to continue to increase well into the future.

To address future water supply needs, Loudoun Water embarked upon a water supply planning initiative, culminating in the Potomac Water Supply Program (PWSP), a comprehensive water supply and treatment program that initially includes: (1) design and construction of a new Loudoun Water Treatment Plant (LWTP) and finished water transmission system, and (2) design and construction of a new raw water intake, pumping station, and raw water transmission main. Future projects will include the implementation of a quarry storage system.

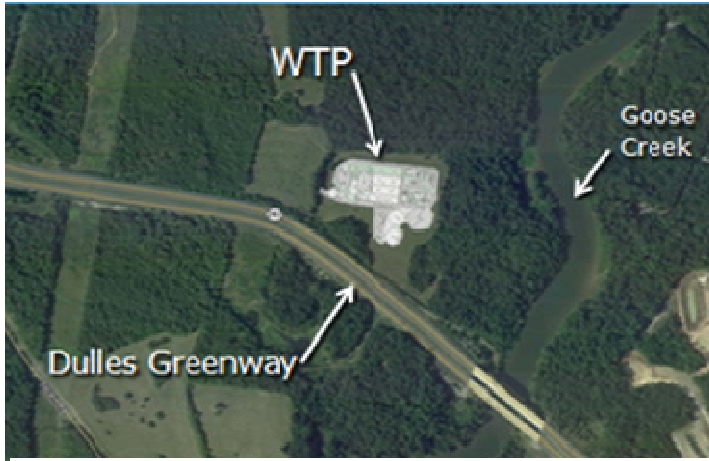
## Program Schedule

Based on growing system demands in the Loudoun Water service area, the LWTP may need to be online as early as 2016 to meet projected maximum day demands. Under the current schedule, notice of award of the construction contract is expected to occur around the 4<sup>th</sup> quarter of 2013. The Final Design Phase (including permitting and agency review) is currently underway with a total duration of approximately 14 months. The Bid Phase would precede notice of award and would last approximately 6 months. The construction phase is expected to last nearly 36 months. During the construction phase, any water-bearing or retaining structure (e.g. sediment basins) will be tested for leaks. Pipes will also be pressure tested. Therefore, discharge is likely to begin on or around September 1, 2014. Beneficial Use of the LWTP is estimated to occur around June 2016, with Final Completion toward the end of the 4<sup>th</sup> quarter of 2016.

## Site Location and Development

The LWTP will be built on a 50-acre site, which has a net area available for development of around 12 acres. The site is located to the west of Goose Creek and is adjacent to the north side of the Dulles Greenway. The site slopes gently from north to south with a drop in elevation of about 22 feet, which allowed the water treatment facility, residuals facility, and clearwells to be strategically located to minimize rock excavation, earth moving, and head losses across the plant.

Selected site plan sheets from the complete set of construction drawings sent to Loudoun County for review and approval are provided in **Attachment A**. These plan sheets present the overall layout of the LWTP facility, site grading, yard piping, and the location of the proposed VPDES outfall.



*The Loudoun Water Treatment Plant will be located on a 50-acre parcel west and adjacent to Goose Creek and the north side of Dulles Greenway.*

All stormwater will be captured and detained in stormwater retention ponds located on the southern portion of the site to comply with “no net increase in runoff” to adjacent properties and watercourses. In addition to VPDES permit compliance, the chief environmental concerns for the plant site include the 300-foot “no-build” buffer along Goose Creek, preservation of existing trees, and careful design of stormwater, erosion, and sediment controls during and following construction.

## Outfall Location and Receiving Water

### Outfall Location

The LWTP VPDES discharge system will terminate at a single outfall (001) to the southeast of the single existing clearwell and adjacent to the east side of the emergency overflow basin. The primary discharge will be conveyed from the LWTP facility through a 16”-diameter pipe to the outfall location. The pipe runs from north to south and parallels the east perimeter fence. It will include a flow meter and a reducing agent (e.g. bisulfite) feed for dechlorination as needed. Emergency clearwell overflows will be conveyed to the emergency overflow basin adjacent to the VPDES outfall. Once the emergency overflow basin reaches maximum capacity, emergency overflows will be released through the VPDES outfall 001.

The outfall is located just inside the limits of disturbance and just outside of a 300-foot no-build buffer that parallels Goose Creek (**Sheet G-I-C5, Attachment A**). While bank armoring with rip-rap is planned at the outfall location, the ephemeral stream which will convey flows to Goose Creek is outside the limits of disturbance. Therefore, bank stabilization or channel modification would currently not be allowed. However, large portions of the existing channel are naturally lined with exposed bedrock and large boulders, which should assist in conveying flows and reducing erosion potential. If it is determined that engineering of the ephemeral stream is required, consultation with Loudoun County would be needed in order to obtain an exception.

If the preferred location is deemed unsuitable, an alternate VPDES outfall location has been identified to the south and east of the preferred location, approximately 300 feet downstream of the Dulles Greenway-Goose Creek bridge crossing. If the alternate location is selected, discharge would be piped underground from the facility to the left bank of Goose Creek where it would empty directly into the stream. The discharge pipe would parallel the finished water transmission and sanitary sewer mains which would cross under Goose Creek directly upstream of the proposed VPDES outfall.

A site overview showing the preferred and alternate VPDES outfall locations is provided in **Attachment B**.



## Receiving Water: Un-named Tributary to Goose Creek

From the outfall, the VPDES discharge will be conveyed approximately 700 feet by an un-named tributary before entering Goose Creek. A site assessment of the un-named tributary was conducted by a CDM Smith wetland scientist consisting of a physical characterization and habitat assessment of the un-named tributary according to the U.S. EPA Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers. The purpose of this assessment was to characterize the stream and to determine whether the existing channel could convey the proposed discharge flows from the outfall to Goose Creek.

The assessment was conducted on November 6, 2012, approximately two days following a moderate rain event. The physical characterization of the un-named tributary determined that the un-named tributary is an ephemeral, warmwater stream in which the channel is 95% dry with ponding only in the deepest pools. The ephemeral stream consists of a braided channel system containing as many as three dry channels with a mosaic of upland and wetland areas in between. The northernmost channel, which is the largest of the three, would receive the discharge from the outfall. The discharge would then follow a natural course down-gradient and would be conveyed by the entire braided system.

The channel substrate consisted of mainly boulders and cobbles with silt in the interstices. In several reaches, exposed bedrock forms a significant percentage of the substrate composition. The channel also contained significant organic material (detritus) consisting largely of fallen leaves and woody debris.

Channel width and depth were taken in five characteristic locations. While all channels present within the braided system were assessed, the northernmost channel will convey the majority of flow; therefore, its channel characteristics are described in further detail. The average channel depth for the main channel was approximately 1.5 feet with the vast majority of depths ranging from 1.0 to 3.0 feet. The average channel width for the main channel was 12.5 feet. However, at points where the system braided, the entire width of multiple channels and the associated wetland mosaic averaged approximately 70 feet.

Riparian vegetation is dominated by trees and sparse herbaceous vegetation with relatively few shrubs and saplings present. Dominant species include eastern red-cedar and a variety of oaks. The canopy partly shades the entire braided channel system along its length. Given the season in which the assessment was conducted, it is assumed that herbaceous species likely compose a greater percentage of riparian cover.

The discharge will be conveyed via the ephemeral stream system to its confluence with Goose Creek. The confluence is characterized by emergent wetlands which continue for approximately 150 feet before reaching the open water of the Goose Creek channel. These natural wetlands will help filter out any sediment and other suspended material that may have been picked up by the discharge during its journey from the outfall through the ephemeral stream channel. The point at which the discharge is expected to enter Goose Creek is 0.62 miles upstream of the Goose Creek Dam and 0.35 miles upstream of the City of Fairfax water intake.

CDM Smith used the data collected from the site assessment, previous surveys, and GIS to create and run a hydraulic model to determine if the ephemeral stream could handle proposed maximum intermittent flows (4.0 mgd) in its existing condition. The model used cross-sections cut every 50 feet along the stream's 700-foot length from the outfall to Goose Creek.

Given the maximum discharge rate of 4.0 mgd, the maximum depth of flow within the channel would be 1.0 feet, which the model determines the ditch could convey in its existing condition. The maximum flow velocity under maximum discharge conditions is 4.0 feet/second, which is below the typical erosive flow

velocity (5.0 feet/sec) for a clay-mixed bed channel for the given channel slope. While a clay-mixed bed channel is typical for the region, the un-named tributary contained larger-diameter substrate particles such as boulders and cobbles. Therefore, proposed maximum flows are unlikely to result in substantial bed erosion within the ephemeral stream channel.

Photographs of the un-named tributary and a brief report detailing the hydraulic model is presented in **Attachment C**.

## Receiving Water: Goose Creek

The Goose Creek watershed is 385 square miles, covering nearly half of Loudoun County and one-quarter of Fauquier County in the northern Virginia piedmont. The creek's headwaters are located at Manassas Gap on the Blue Ridge near Linden, Virginia. The main channel itself is 53.9-miles long and follows an east-northeast course before reaching the Potomac River just east of Leesburg and south of Harrison's Island. Historically, the creek served as a river of commerce for mills in the upper watershed and a system of locks and dams were constructed to render the creek navigable. The canal system began at the mouth of Goose Creek and continued 12 miles upstream. However, by 1857 commercial traffic had ceased and most of the locks and dams were destroyed soon thereafter by the Union Army during the Civil War. The remains of a canal system are still visible on properties in the lower part of the creek watershed.

The entire portion of Goose Creek within Loudoun County was designated state Scenic River in 1976 due to the cultural and natural significance of the stream. Current impervious cover is estimated to be less than 5% of the watershed, with forested areas (41%) making up the single largest land use. Significantly, over 20% of the watershed is permanently protected from development by conservation easements.

Previous water quality studies indicate it is one of the cleanest waterways in Virginia and it harbors a high level of small stream invertebrate biodiversity. However, impacts from development, inadequate stream buffers, and failing septic systems have resulted in the designation of several stream segments as impaired. In 2003, EPA Region III approved the Total Maximum Daily Load (TMDL) report that listed Goose Creek as failing to attain the primary contact use due to elevated concentrations of fecal coliform bacteria. However, by 2008, EPA Region III listed only the segment of Goose Creek below Goose Creek Dam to its confluence with the Potomac River as impaired due to high bacteria levels. This segment was also listed for benthic impairments due to impacts to the resident macroinvertebrate community. All other segments are currently listed as meeting designated uses.

Goose Creek is also a major water source, providing drinking water to the City of Fairfax and Loudoun County. The Goose Creek Reservoir is impounded by Goose Creek Dam and is owned by the City of Fairfax for drinking water purposes. Completed in 1960, Goose Creek Dam is a gravity dam with a height of 39 feet and a length of 715 feet. At normal levels, the reservoir has a surface area of 120 acres and storage of 613 acre feet.

Additional standards come into effect when discharging to a public water supply (PWS). The Goose Creek Reservoir is designated a Tier II receiving water by DEQ. Tier II protects water that is better than specified water quality standards. Since water quality may only be lowered in these waters in certain circumstances, Tier II anti-degradation limits will likely apply. DEQ has previously indicated that the proposed outfall location may be preferred from a water quality standpoint as it is located farther back from Goose Creek, thereby providing a contaminant buffer.

Discharge to a PWS also requires coordination with the Virginia Department of Health (VDH), as they are responsible for water supply protection. A meeting between VDH, Loudoun Water, and CDM Smith

occurred on October 1, 2012. VDH was told of the pursuit of a VPDES permit which would discharge to the Goose Creek Reservoir and the proposed outfall location was reviewed. VDH was not opposed to the discharge or the outfall location and indicated that DEQ will request VDH input primarily on disinfection requirements for the discharge. VDH also noted that water supply source water quality standards will be enforced.

Due to its importance as a natural, cultural, and municipal resource, the proposed VPDES discharge to Goose Creek will involve many stakeholders. In addition to VDH, the Goose Creek Scenic Advisory Committee, appointed by the director of the Virginia Department of Conservation & Recreation (DCR), has the stated mission to protect the scenic quality of Goose Creek. Civic groups include the Goose Creek Association which is committed to protect and preserve the natural resources, natural heritage, and quality of life within the Goose Creek watershed. The Goose Creek Association monitors the stream and regularly tests water quality at 19 monitoring stations. Water quality monitoring includes macroinvertebrate, water chemistry, and *E. coli* sampling. The nearest to the proposed outfall is Station 20, located approximately 10 miles upstream in the Banshee Reeks Nature Preserve. Physical stream data can also be obtained from the nearest USGS Gage 01644000 – Goose Creek near Leesburg, which is located approximately 5.5 miles upstream of the proposed VPDES outfall.

## Sources, Design Flows, and Monitoring

During normal operations, the LWTP is designed to recycle most flows. Therefore, the VPDES discharge would handle flows from the following sources as needed:

- Construction start-up water drained from a tank after leak-test or disinfection. Until VDH approves water as potable, it cannot go to the distribution system.
- Water that has overflowed the treatment basins and could not be recycled.
- Water that had to be drained from a basin (e.g. if a coagulant dose was not administered correctly, that water would need to be drained and discharged unless it could be recycled without creating a coagulation upset) or gradually sent to sewer.
- Water from the recycle system if some restriction (physical or imposed) created a situation where water had to be discharged.
- Water from the clearwell underdrain pipe may be conveyed to the VPDES discharge location so that it can be properly treated and discharged if a clearwell leak develops resulting in a chlorine residual.
- In an emergency situation, water that has overflowed the clearwell and has been transported by the clearwell overflow ditch to the emergency overflow basin.
- A small amount of rainwater from the clearwell overflow ditch and emergency overflow basin (dry pond) created to catch potential clearwell overflow.
- In the future, discharge of belt press filtrate, centrate, or thickener decant could be added following dechlorination. Initially, the LWTP will not have dewatering equipment.

Design flows for the LWTP include continuous flows of up to 1.0 mgd and intermittent flows up to 4.0 mgd. While the plant is designed as a recycle facility, allowing continuous flows will give the operator the option to discharge small quantities of treated process wastewater. The larger, intermittent flows would likely only occur during construction-phase testing, plant start-up, and in emergency situations.



The VPDES discharge will meet all required water quality limits. For water treatment plants, pollutants of concern typically include total suspended solids (TSS), residual chlorine, and pH. Expected water quality ranges for the VPDES discharge include:

TSS: < 30 mg/L average

Residual Chlorine: 0 mg/L (as a result of dechlorination)

pH: 6 – 9

There are two planned dechlorination points within the VPDES discharge system. The primary dechlorination point would feed into the 16" VPDES pipe and would dechlorinate controlled discharge. The other feed point would be located at the flume and would only be active if the clearwell overflows or the clearwell begins to leak appreciably. The location of all chemical feed points can be found on the process flow schematics provided with EPA Application Form 2D.

Monitoring of the VPDES discharge will occur throughout the process to ensure that all pollutant limits set by DEQ within the VPDES permit will be met at the end of pipe at the outfall location. Previous coordination with DEQ provided a general overview of toxicity monitoring requirements. Intermittent discharges will require acute toxicity testing. Acute testing will occur for the first eight quarters, and if all limits are met, annual testing will be implemented. If toxicity levels are in excess of stated limits, then more frequent testing may be required or plant-specific limits may be written into the permit. For continuous flows, DEQ requires chronic toxicity testing in addition to acute toxicity testing.

## Emergency Overflows

As with any water treatment plant, the potential exists for catastrophic emergency overflows. Standard language referring to unusual and extraordinary discharges has been written into the VPDES permit for the nearby City of Fairfax Goose Creek WTP. It is expected that similar language will be written into the VPDES permit for the LWTP. This language requires the operator to notify DEQ within 24 hours of an overflow event and requires submission of a written report of the incident within five days.

The LWTP contains two emergency overflow points, the clearwell and the emergency basin, which have been identified in **Figure 1-1**. All other potential plant overflows (e.g., sedimentation basin overflows) are routed to the emergency basin. While emergency overflow events are infrequent, unpredictable events, it has been estimated that the frequency of clearwell overflow would be once every five years based on comparable events at similar, existing facilities. Clearwell overflows would be collected and conveyed using an internal pipe system that would discharge to a designed overflow ditch to the east of Clearwell No. 1. From there, the clearwell overflows would be transported to the dry pond emergency overflow basin at the VPDES outfall 001 location. The clearwell overflow ditch parallels a 12"-PVC clearwell underdrain pipe that will transport potential clearwell leaks to VPDES outfall 001. Flows from the clearwell underdrain system could be continuous if the clearwell leaks appreciably. Details regarding the location of the clearwell overflow ditch and clearwell underdrain can be found on **Sheet G-1-C25, Attachment A**.

Clearwell overflow is essentially the same as tap water, so it typically contains very low levels of suspended solids, has a pH in the 7 to 9 range, and has a chlorine residual of approximately 1.0 to 3.0 mg/L. Therefore, bisulfite or calcium thiosulfate would be fed into the system at the VPDES discharge point using a Parshall flume to pace the feed if the risk of overflow merits such preparation. Dechlorination will occur within the flume so that total residual chlorine limits are met.

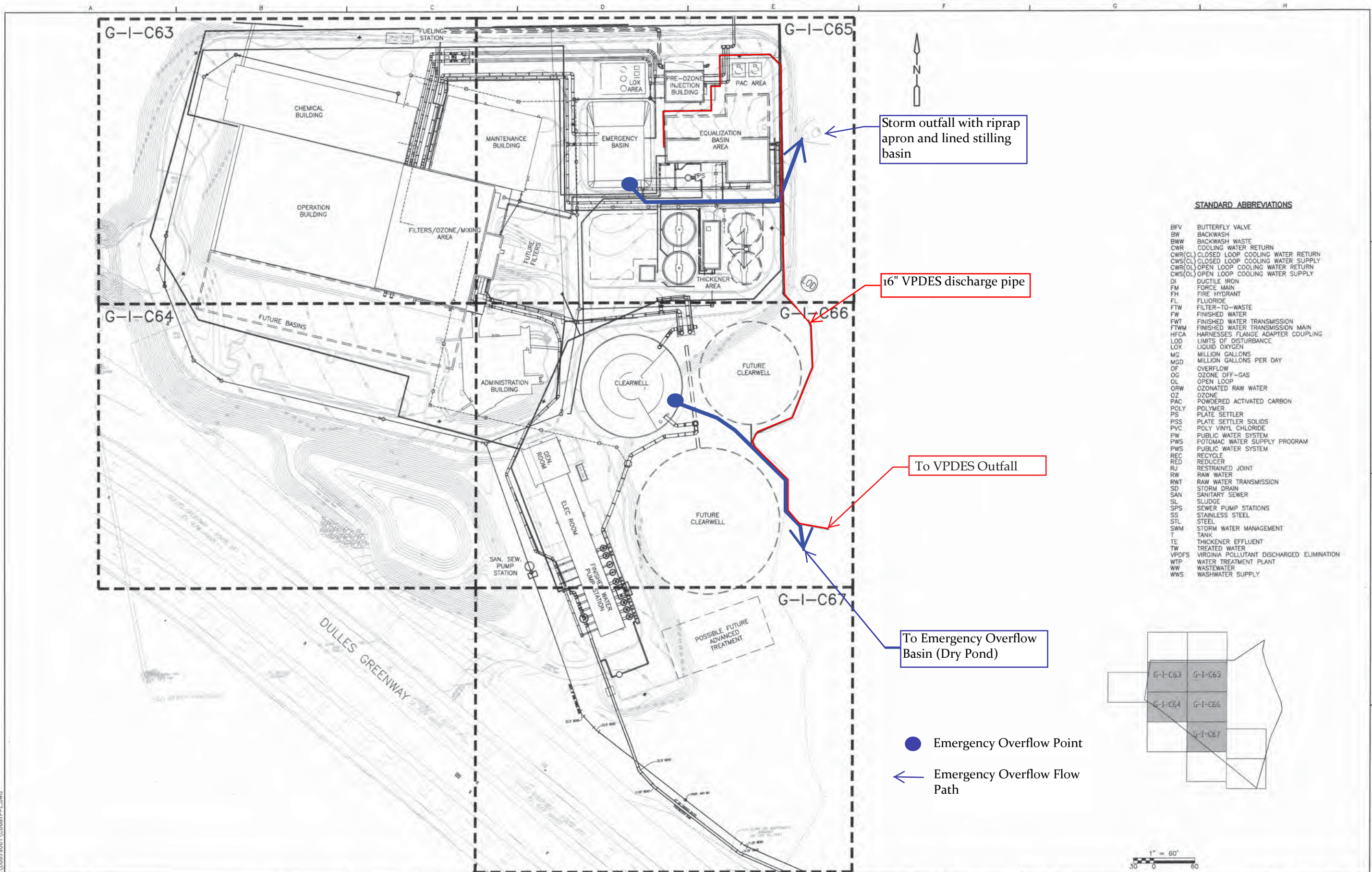
Potential emergency overflows could also occur at the emergency basin. It is estimated that emergency basin overflows would occur only once every ten years based on preventative controls and comparable events at similar, existing facilities. Rising levels in the treatment plant basins first cause alarms and shutdown of flows. If this equipment would not respond in time, basin overflows would flow into the emergency basin. Rising levels within the emergency basin should shut down all flow to the plant before allowing a discharge. If this second level of protection fails, the overflow would flow eastward along the access road before emptying into a designed storm outfall consisting of a downstream riprap apron and lined stilling basin. Once capacity is exceeded at the stilling basin, flows would run down the hill slope towards Goose Creek. There is a potential that a large volume of water could scour the hillside and contribute significant sediment to Goose Creek. However, given the two levels of emergency basin overflow preventative controls, the likelihood of such a catastrophic plant failure would be very low.

Emergency basin overflow would likely have higher solids concentrations than the clearwell overflow, since it does not contain final potable water. However, if the emergency basin ever overflows, that overflow should not contain a chlorine residual.



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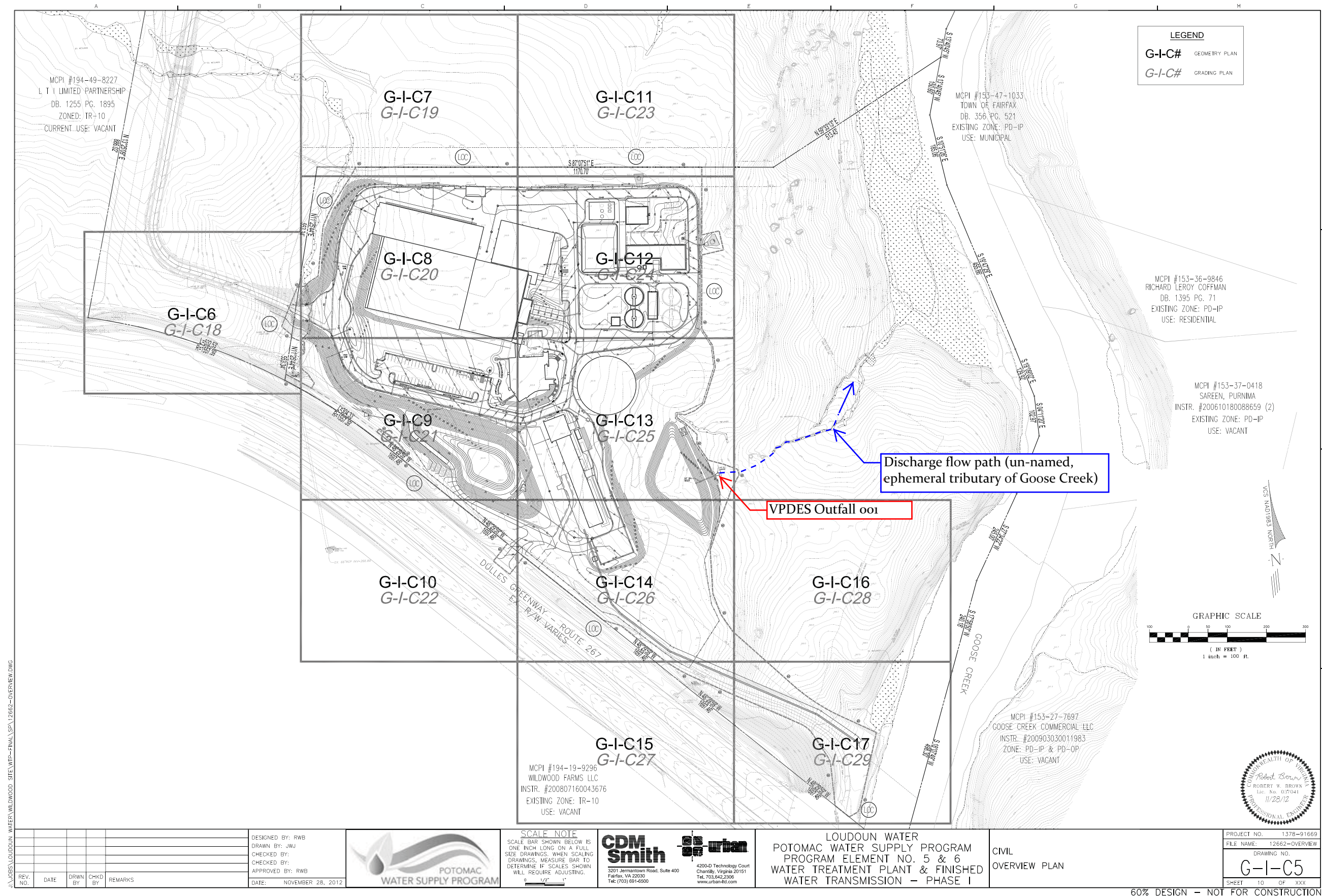


DESIGNED BY: XXX		<b>CDM Smith</b> 3201 Jermantown Road, Suite 400 Fairfax, VA 22030 Tel: (703) 691-6500	LOUDOUN WATER POTOMAC WATER SUPPLY PROGRAM PROGRAM ELEMENT NO. 5 & 6 WATER TREATMENT PLANT & FINISHED WATER TRANSMISSION - PHASE I	Figure 1-1 Emergency Overflow Points and Overflow Flow Paths	PROJECT NO. 1378-91669
DRAWN BY: J. SOSA					FILE NAME: C068YPPL
CHECKED BY: XXX					DRAWING NO. G-1-C62
APPROVED BY: XXX					SHEET XXX OF XXX
DATE: JUNE 2013	60% DESIGN - NOT FOR CONSTRUCTION				

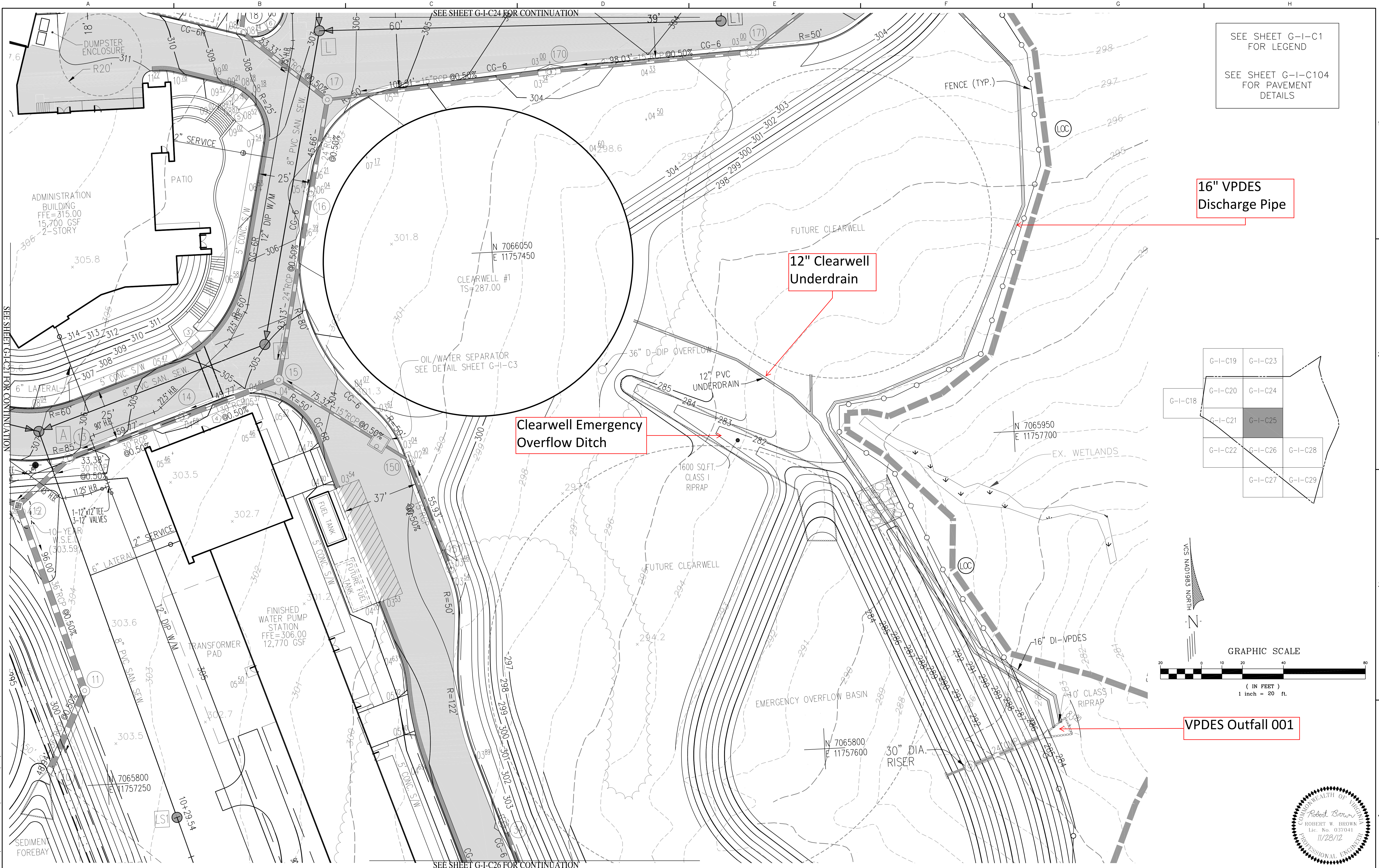


## Attachment A

### Select Site Plan Sheets







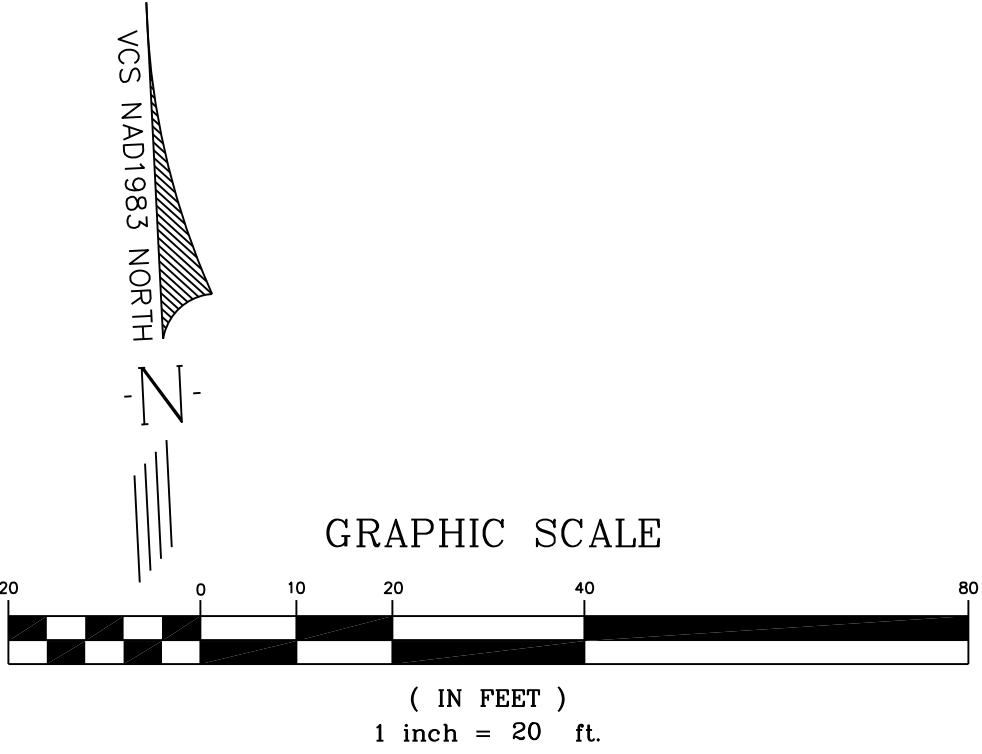
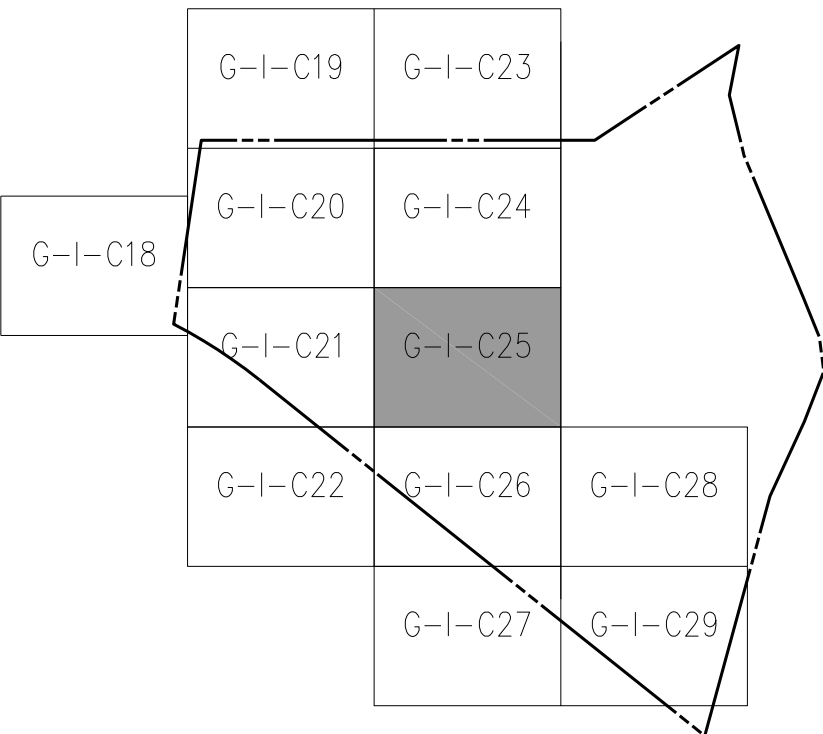
SEE SHEET G-I-C1  
FOR LEGEND

SEE SHEET G-I-C104  
FOR PAVEMENT  
DETAILS

16" VPDES  
Discharge Pipe

12" Clearwell  
Underdrain

Clearwell Emergency  
Overflow Ditch



VPDES Outfall 001

REV. NO.	DATE	DRWN BY	CHKD BY	REMARKS

DESIGNED BY: RWB
DRAWN BY: JWW
CHECKED BY:
CHECKED BY:
APPROVED BY: RWB
DATE: NOVEMBER 28, 2012



SCALE NOTE  
SCALE BAR SHOWN BELOW IS  
ONE INCH LONG ON A FULL  
SIZE DRAWING. WHEN SCALING  
DRAWINGS, MEASURE BAR TO  
DETERMINE IF SCALES SHOWN  
WILL REQUIRE ADJUSTING.

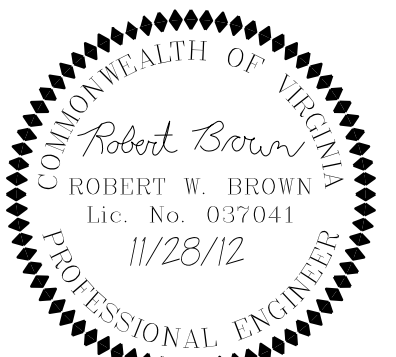
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LOUDOUN WATER  
POTOMAC WATER SUPPLY PROGRAM  
PROGRAM ELEMENT NOS. 5 & 6  
WATER TREATMENT PLANT & FINISHED  
WATER TRANSMISSION - PHASE I

CIVIL  
SITE GRADING PLAN

PROJECT NO.	1378-91669
FILE NAME:	12662-GRADING
DRAWING NO.	G-I-C25
SHEET	30 OF XXX



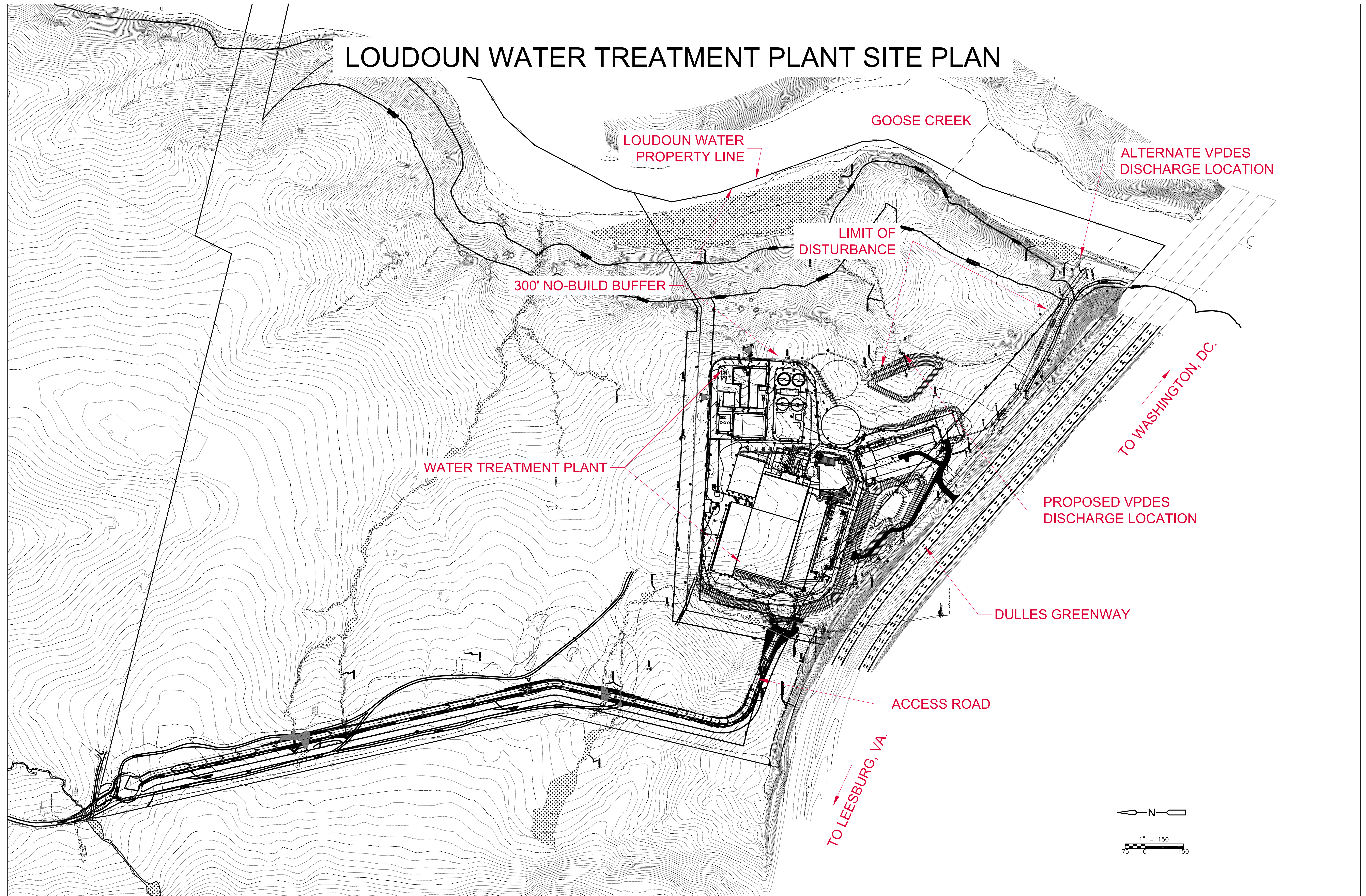


## Attachment B

### Proposed and Alternate VPDES Outfall Locations



# LOUDOUN WATER TREATMENT PLANT SITE PLAN





## Attachment C

# Receiving Water Photographs and Hydraulic Model Summary Report



**Loudoun Water VPDES Discharge Outfall – Ditch – Goose Creek**  
Site Visit and Channel Assessment Representative Photographs



Photo 1: Confluence of ditch with emergent wetlands on right bank of Goose Creek



Photo 2: Channel located approximately 30 feet upstream of confluence. Measurements indicate a shallow (2'), wide (17.5') channel at this location.





Photo 3: Typical view of the northern (main) channel. Looking upstream approximately 400' from the confluence with Goose Creek.



Photo 4: Typical view of the southern channel. Looking upstream approximately 400' from the confluence with Goose Creek.





Photo 5: View of the northern (main) channel approximately 50 feet downstream from proposed outfall location.





## Memorandum

To: Mr. Charles Moore

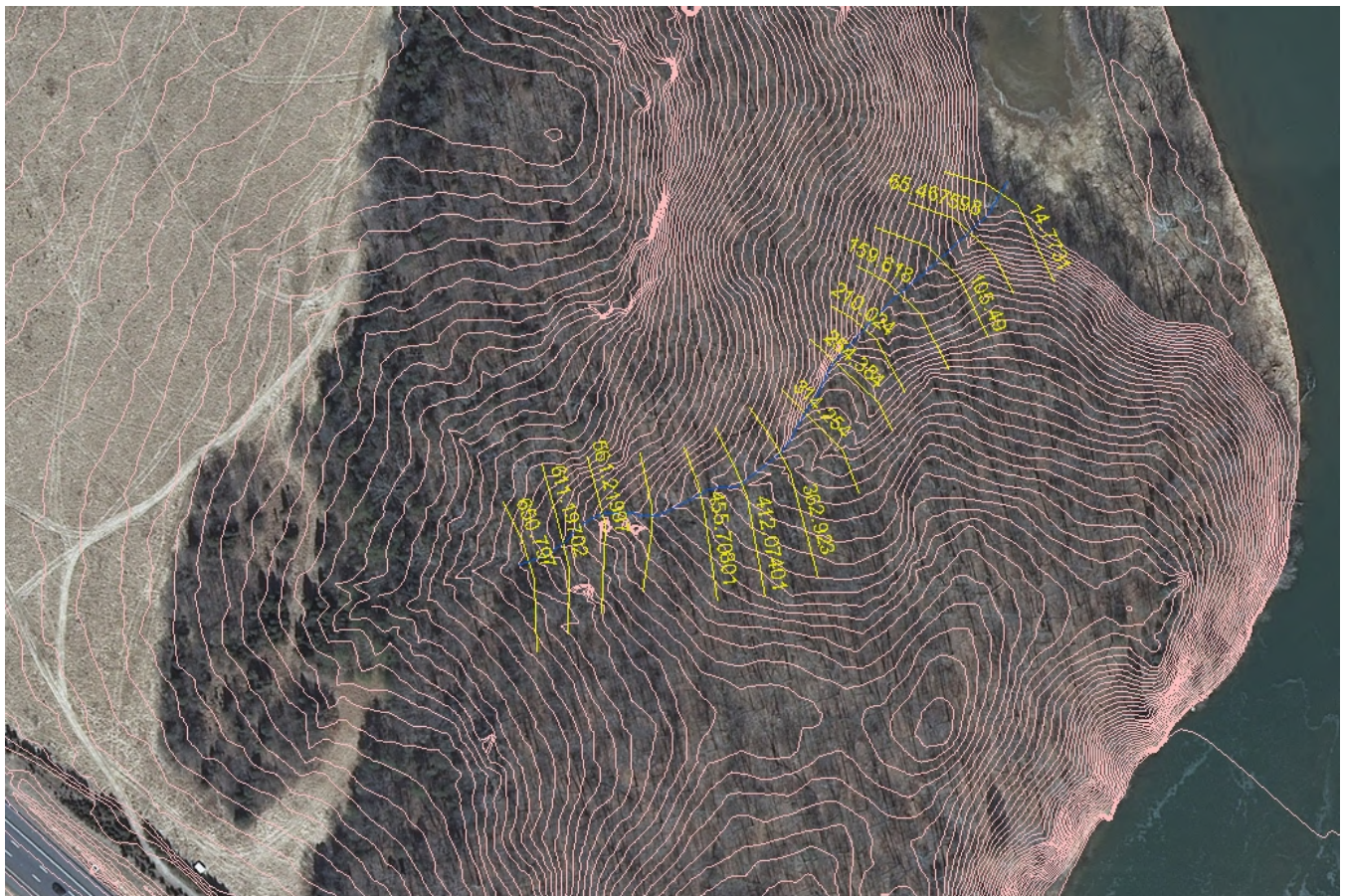
From: Seungho Song

Date: November 8, 2012

Subject: VPDES Ditch HEC-RAS Modeling

The following summary is prepared for a HEC-RAS modeling of the Loudoun Water Treatment Plant (LWTP) VPDES ephemeral stream system.

1. HEC-RAS modeling is proposed for the un-named tributary of Goose Creek from the proposed outfall location to its confluence with Goose Creek. It consists of approximately 700 linear feet through a natural valley to the Goose Creek Reservoir.
2. The natural ditch is 700 feet in length and shows a relatively steep slope with an average grade of 6.5% ( $S=0.065$ ). Geometry files for the HEC-RAS were prepared by a triangulated irregular network (TIN). Cross sections were cut every 50 feet apart.



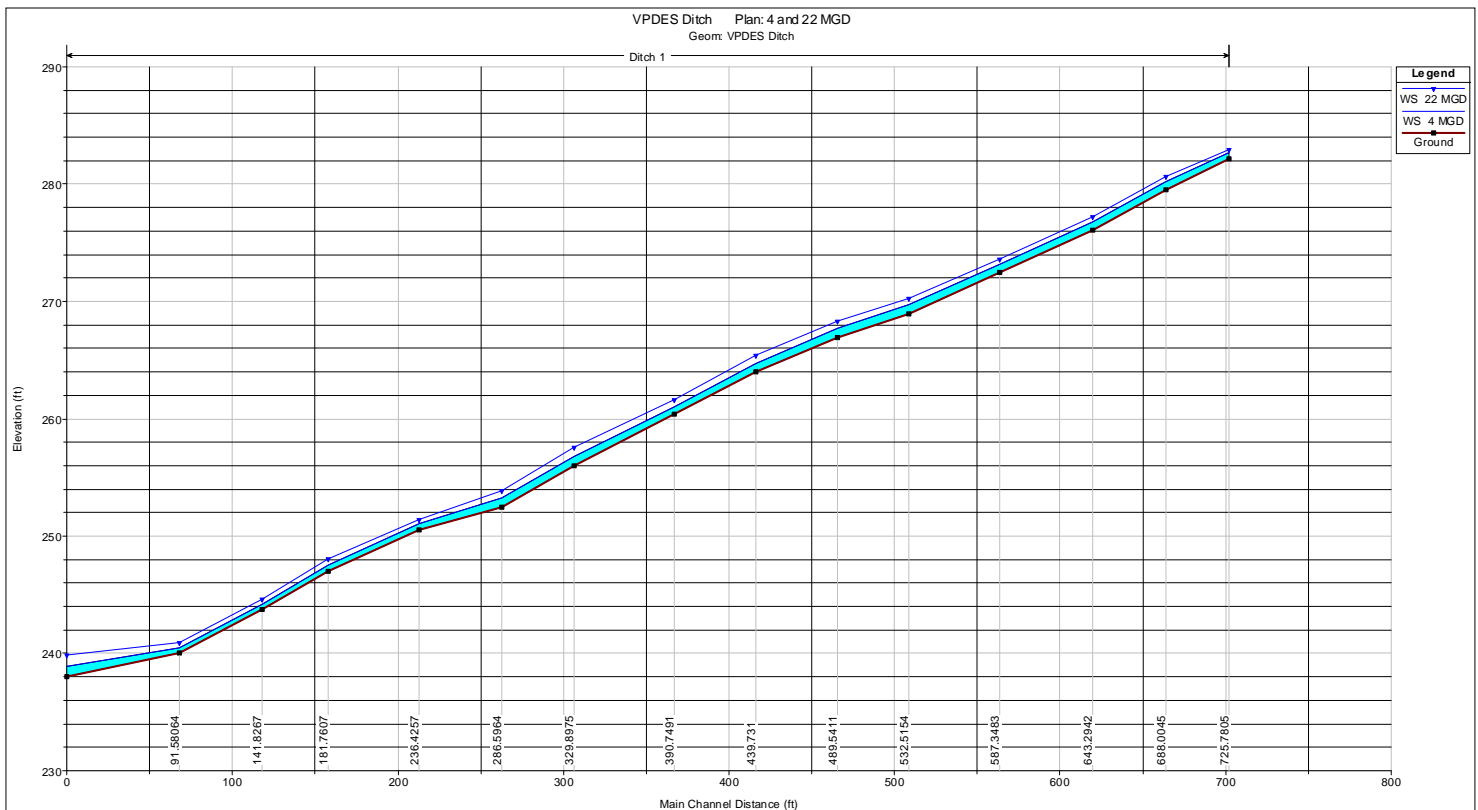
VPDES

3. Roughness coefficients for channel ( $n=0.065$ ) and overbanks ( $n=0.10$ ) are determined from the site assessment, field photographs, descriptions of vegetation type and density, and aerial photographs.
4. The receiving waterbody is the Goose Creek Reservoir and it is not anticipated that the downstream condition will affect the water surface profile for the ephemeral stream system. The slope area method (Normal Depth Method) is used for the downstream boundary condition.
5. The maximum discharge rate is given as 4.0 MGD, which is equivalent to 6.2 cfs. The maximum discharge rate of 4.0 MGD represents the maximum proposed intermittent discharge. The total plant capacity of 22.0 MGD was also evaluated as a basis for comparison.

$$4 \text{ MGD} = (4,000,000 \text{ Gal/Day}) / (7.481 \text{ FT}^3/\text{Gal}) / (86,400 \text{ Sec/1Day}) = 6.2 \text{ FT}^3/\text{Sec}$$

$$22 \text{ MGD} = (22,000,000 \text{ Gal/Day}) / (7.481 \text{ FT}^3/\text{Gal}) / (86,400 \text{ Sec/1Day}) = 34.0 \text{ FT}^3/\text{Sec}$$

6. HEC-RAS modeling for the ephemeral stream system was conducted using 6.2 and 34.0 cfs to evaluate natural ditch capacity, flow velocities, and other hydraulic conditions.



7. REC-RAS results:

- Max depth of flow: 1.0 ft for 4 MGD, 1.5 ft for 22 MGD
- Max flow velocity: 4.0 f/s for 4 MGD, 5.3 f/s for 22 MGD

For 4.0 MGD, the HEC-RAS modeling results indicate that the flow will be relatively shallow (1.0 ft) in depth and flow velocity (4.0 ft/sec) will be slightly less than the typical erosion flow velocity for clay-mixed bed channels of similar slope (5.0 ft/sec). While clay-mixed bed channels are typical of the region, field reconnaissance indicates that the channel bottom often consists of boulders and cobbles with occasional bedrock outcrops.

The two tables below summarize hydraulic data from the HEC-RAS modeling for 4 and 22 MGD.

#### 4 MGD

River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
650.80	6.20	282.20	282.68	282.64	282.74	0.04688	2.01	4	24	0.70
611.20	6.20	279.50	280.19	280.18	280.31	0.09419	2.81	2	11	0.97
561.22	6.20	276.10	276.82		276.91	0.06254	2.41	3	9	0.80
510.54	6.20	272.50	273.19	273.15	273.28	0.06743	2.40	3	11	0.83
455.71	6.20	268.91	269.71	269.62	269.85	0.05762	3.04	2	5	0.81
412.07	6.20	266.95	267.72	267.60	267.82	0.03903	2.49	2	6	0.67
362.92	6.20	264.00	264.73	264.73	264.92	0.09509	3.49	2	5	1.02
314.25	6.20	260.39	261.04		261.14	0.05257	2.45	3	8	0.75
254.38	6.20	256.00	256.77	256.77	256.97	0.09253	3.54	2	5	1.01
210.02	6.20	252.50	253.29		253.37	0.04958	2.38	3	8	0.73
159.62	6.20	250.50	251.02		251.08	0.04224	1.99	3	17	0.67
105.49	6.20	247.01	247.56	247.56	247.70	0.09872	3.03	2	7	1.01
65.47	6.20	243.74	244.21		244.28	0.05587	2.10	3	12	0.75
14.77	6.20	240.00	240.44	240.44	240.57	0.10189	2.83	2	9	1.01

#### 22 MGD

River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
650.80	34.00	282.20	282.95	282.95	283.11	0.06467	3.81	14	47	0.92
611.20	34.00	279.50	280.62	280.62	280.77	0.04531	3.63	16	53	0.79
561.22	34.00	276.10	277.26	277.26	277.55	0.06599	4.37	9	18	0.95
510.54	34.00	272.50	273.59	273.59	273.82	0.06559	4.01	10	25	0.93
455.71	34.00	268.91	270.27	270.27	270.49	0.05234	4.26	12	29	0.86
412.07	34.00	266.95	268.28	268.28	268.50	0.04010	4.16	13	32	0.77
362.92	34.00	264.00	265.42	265.42	265.70	0.08085	4.28	8	15	1.02
314.25	34.00	260.39	261.61	261.54	261.85	0.05455	3.96	9	14	0.86
254.38	34.00	256.00	257.54	257.54	257.98	0.07468	5.33	6	7	1.01
210.02	34.00	252.50	253.85	253.79	254.11	0.04325	4.23	10	17	0.80



Mr. Charles Moore  
November 8, 2012  
Page 4

159.62	34.00	250.50	251.38	251.36	251.59	0.05817	4.00	11	26	0.89
105.49	34.00	247.01	248.10	248.10	248.33	0.06113	4.07	10	23	0.91
65.47	34.00	243.74	244.61	244.59	244.84	0.06506	3.85	9	20	0.92
14.77	34.00	240.00	240.92	240.92	241.15	0.08393	3.86	9	20	1.02

## Appendix B

### Facility Description - Plant Processes

# Loudoun Water Treatment Plant: Facility Description – Plant Processes

## Introduction

The Potomac Water Supply Program (PWSP) will meet the projected net water demand through a phased capacity expansion of the Loudoun Water Treatment Plant (LWTP) and pumping and transmission facilities over a 28-year planning period (through 2040). The plant will start up at a rated Stage 1 capacity of 20 mgd (net capacity for finished water pumped to the distribution system). Plant capacity will be increased incrementally to meet future demands, either through expansion to the Stage 2 capacity of 40 mgd (net), or through uprating to 30 mgd with expansion to 40 mgd deferred to a future date. Uprating of the plant will require one year of full-scale testing and approval by the Virginia Department of Health (VDH). The LWTP will supply Loudoun Water's water distribution system initially through one transmission main extending from the plant to the distribution system.

A unique aspect of the PWSP is the utilization of "water banking" in retired rock quarries. The raw water supply system will allow direct pumping of Potomac River water to existing rock quarries for storage and then use during times of low river flow or adverse water quality conditions. The first quarry is scheduled to be brought online by 2020 and will provide approximately 1 billion gallons of raw water storage for the LWTP. Ultimately, up to four quarries will be available and are planned to provide an estimated eight billion gallons of raw water storage.

As part of the design approach, water quality challenges and trends observed at "benchmark" treatment plants currently in operation along the Potomac River (including Fairfax Water's Corbalis WTP and the Town of Leesburg WTP) were documented and used for development of treatment goals and process train selection for the new plant. Based on this analysis, an ozone-biofiltration treatment process train was selected for the LWTP. This state-of-the-art process train will provide robust treatment for the Potomac River and quarry raw water supplies to meet or surpass minimum requirements of federal and VDH water quality regulations, allow for blending with treated water from Fairfax Water, and produce water of high quality for Loudoun Water's customers in a cost-effective manner.

## Drinking Water Regulations and Treatment Goals

Under the 1996 Safe Drinking Water Act (SDWA) Amendments, the US Environmental Protection Agency (EPA) developed several regulations for public drinking water systems that became effective in the late 1990's and early 2006, which apply to surface water treatment plants and public water distribution systems. These regulations include revisions to the Total Coliform Rule (TCR) and Lead and Copper Rule (LCR) and the following new rules: Interim Enhanced Surface Water Treatment Rule (IESWTR), Stage 1 disinfectants and disinfection byproducts rule (D/DBPR), Stage 2 D/DBPR, the Long Term Stage 1 Enhanced Surface Water Treatment Rule (LT1ESWTR), the Long Term Stage 2 Enhanced Surface Water Treatment Rule



(LT<sub>2</sub>ESWTR), and the Filter Backwash Recycling Rule (FBRR).

Based on a review of water quality trends for the Potomac River, treatment performance history of the Potomac River benchmark plants, and VDH “optimized” treatment performance criteria, a set of stringent finished water quality goals was adopted for the LWTP, which will allow compliance with all existing and anticipated federal drinking water regulations, and VDH’s “optimized” criteria for treatment plants in Virginia. These include Phase 1 goals for design and operation of the new LWTP, and Phase 2 goals that could potentially be adopted for the 40-mgd capacity expansion of the plant, depending on future regulatory compliance requirements, the need to provide advanced treatment for a degraded Potomac River or quarry source water supply, or the desire for improved public health protection.

## Water Quality Trends and Testing

Water quality trends for the Potomac River were characterized by analyzing historical raw water quality for the two benchmark WTPs (Corbalis and Town of Leesburg) for the period 2006 through 2010. The Corbalis WTP intake is located approximately two miles downstream of the proposed intake location for the new LWTP, whereas the Leesburg intake is located just upstream from the new LWTP intake. Table 1-1 presents a summary of routine water quality parameters at the Corbalis intake. A comparison of raw water quality trends for these plants indicate similar water quality characteristics, so it was concluded that historical treatment performance of the ozone-biofiltration train at Corbalis can be used with a high degree of confidence to predict treatment performance at the LWTP.

**Table 1-1**  
**Summary of Raw Water Quality Parameters for the Corbalis WTP**

Parameter <sup>1</sup>	Years 2006 through 2010		
	Min	Average <sup>2</sup>	Max
Aggressiveness Index No.	11	12	13
Alkalinity, mg/L as CaCO <sub>3</sub>	56	93	128
Aluminum, mg/L	BQL	0.26	0.89
Bromide, mg/L	BQL	0.03	0.06
Chloride, mg/L	8.7	22.1	40.3
Hardness, total	47	117	175
Iron, mg/L	0.03	0.45	2.27
Manganese, mg/L	BQL	0.04	0.26
N, Ammonia, mg/L as N	BQL	0.01	0.24
N, Nitrate, mg/L as N	BQL	0.9	1.7
N, Nitrite, mg/L as N	BQL	0.01	0.03
pH	7.1	7.9	8.9
Phosphate as Phosphorous, mg/L	BQL	0.01	0.04
Solids, Total, mg/L	22	207	332
Solids, Total Dissolved, mg/L	16	181	258
Solids, Total Suspended, mg/L	BQL	9	108
Total Organic Carbon (TOC), mg/L	2.0	3.1	6.7
Threshold Odor Number (TON)	1	5	12
Turbidity, NTU	1	9	55

BQL = Below Quantitation Limit

<sup>1</sup> Data from Fairfax Water (<http://www.fcwa.org/water/imar.htm>). Water Quality Analytical Reports, Corbalis WTP Source Water

<sup>2</sup> Data BQL were treated as zero values for the computation of the average

The key raw water quality parameters for predicting treatment performance at the LWTP and meeting treatment goals include: turbidity, total organic carbon (TOC), alkalinity, pH, and manganese (Mn). These are briefly discussed below.

For the period of 2005 to 2011, turbidity at the Corbalis and Leesburg WTP intakes was highly variable with values ranging from less than 1 NTU to over 100 NTU. Higher values were associated with rainfall events on the Potomac River watershed. The trends between the two intake locations are very similar, with the Corbalis data showing slightly higher turbidity trends. Although the LWTP will be capable of treating high turbidity river water, these trends support the development of an operating rule that the LWTP rely on use of the quarry supply during high turbidity events on the Potomac River to reduce treatment costs.

TOC concentrations were also highly variable at both WTP intakes for the period 2005 to 2010, with values ranging from 2.0 mg/L to 6.7 mg/L. TOC concentrations at the Corbalis intake were typically 0.5 to 1.0 mg/L higher than for the Town of Leesburg intake, and two past excursion events of 6 and 8.65 mg/L for the Corbalis WTP were recorded associated with rainfall events. These findings validate the assertion that finished water quality produced by the ozone-biofiltration train at Corbalis provides a conservative indication of finished water quality that can be expected at the LWTP.

For the period 2005 to 2011, sampling at both WTP intakes indicates highly variable alkalinity and pH values. Alkalinity was documented as ranging from 56 to 128 mg/L, with pH ranging from 7.0 to 9.0 pH units. This variability indicates that pH control for coagulation and final pH adjustment for corrosion control will likely be a treatment challenge for the LWTP. Use of polyaluminum chloride (PACl) as the primary coagulant at the LWTP – which consumes less alkalinity and is less influenced by variable pH than alum – should mitigate potential coagulation chemistry difficulties.

Mn levels from the Leesburg and Corbalis intake locations were evaluated from December 2004 to August 2011. The Mn levels for the Town of Leesburg plant were significantly higher than the Corbalis plant, ranging from less than 0.01 mg/L to greater than 1 mg/L. By comparison, Corbalis Mn levels range from 0.03 mg/L to 0.3 mg/L. It is highly unusual for dissolved Mn levels to approach 1 mg/L; therefore, the difference may be attributed to measurements of total vs. dissolved Mn and the accuracy of the analytical methods used.

Since elevated Mn levels have been observed at both intake locations, bench-scale tests were performed on preoxidation treatment alternatives for Mn oxidation. Based on bench-scale results, an ozone preoxidation process was recommended for the LWTP for enhancing the coagulation process and oxidation of manganese and taste and odor causing compounds. Based on settled water ozonation bench- and full-scale test results, intermediate ozone dose and contact time design values were selected to meet the ozone primary disinfection goal of 1-log *Giardia* inactivation.

## Water Treatment Process Facilities

Loudoun Water completed a desk-top evaluation of treatment process alternatives in September 2009, and performed site visits to several ozone and membrane plants in the mid-Atlantic area in 2009-2010. Based on this information, Loudoun Water concluded that a conventional treatment process train with



ozonation, biological filtration and chloramination should be considered for treating the Potomac River and quarry water supplies. The selection of an ozone-biofiltration process train for the LWTP was made for the following reasons:

- It is capable of meeting all existing drinking water regulations and provides an effective treatment barrier for removing turbidity, particles, microbial pathogens, organics, manganese, algae, taste and odor compounds and several emerging contaminants and pharmaceutical compounds—all relevant water quality issues for the Potomac River.
- It is currently used at Fairfax Water’s Corbalis WTP and has proven effective in treating Potomac River water for many years. The same basic train is also used at the Henrico County WTP and has been operating successfully in treating James River water for the past ten years.
- The finished water quality produced by the new plant, with chloramines as a secondary disinfectant, will be comparable to purchased water from Fairfax Water and thus avoid any blended water quality impacts in the Loudoun Water distribution system.
- Bench-scale testing showed that a two-stage ozone treatment process will provide both oxidation and primary disinfection benefits at reasonable ozone doses without formation of chlorinated by-products.

The overall water treatment facility layout and basis of design for unit processes (preoxidation, rapid mixing, flocculation, sedimentation, intermediate ozone, filtration, and UV disinfection), clearwells, and the high service pumping station are briefly discussed below. Complete process schematics detailing the flow of water through the plant and the residuals treatment facility are attached to EPA Application Form 2D.

## Overall Water Treatment Facility Layout

A Consolidated Treatment Complex Layout was selected for the water treatment facility and a Campus Layout for the residuals facility, post-filter clearwells and finished water pumping station. This is considered to be the best design approach for providing a cost-effective, operator-friendly treatment facility that meets both plant site and hydraulic gradeline constraints. The process flow schematic for the LWTP includes multiple unit processes, equipment and chemical application points for improved system reliability and enhanced operational flexibility with no “single point of failure” from the plant head works to the finished water pumping station.

## Ozone Preoxidation

Based on bench-scale testing results, ozone is recommended for preoxidation at a design dose of 2 mg/L and contact time of 5.1 minutes for the Phase 1 design flow (21 mgd), which will be reduced to 2.5 minutes for Phase 2 (42 mgd). For the ozone dissolution system, a sidestream injection system with two redundant flash reactors will be included. This equipment will be housed in the Preozone Injection Building, with two 54-inch pipeline contactors running along the plant site to the Operations Building to provide the required contact time for preoxidation.

## Rapid Mixing

The flash mixing design for the LWTP includes a two-stage mixing system consisting of a pumped injection flash mixing system for the first stage and mechanical vertical turbine mixing system for the second stage. This combination allows for sequential addition of treatment chemicals in either or both mixing stages, with the primary coagulant (polyaluminum chloride) typically introduced in the first flash

mixing stage. The two mixing trains will be sized to meet the Stage 2 design flow of 42 mgd. Both stages are designed to provide fully turbulent mixing.

## Flocculation

The flocculation process for the LWTP consists of three-stages of tapered flocculation in concrete basins equipped with vertical turbine-type flocculators and variable-speed drives to control mixing energy. Eight parallel three-stage flocculation trains will be provided initially, with two trains dedicated to each of four sedimentation basins. The hydraulic detention time at design flow with all basins in service will range from 40.2 minutes for Stage 1 to 20.1 minutes for Stage 2. The velocity gradients range from 40 to 100  $\text{sec}^{-1}$  for the three flocculation stages. Each set of two flocculation trains and one sedimentation basin train (four total) can be isolated and removed from service for maintenance by closing the inlet valve on the coagulated water transfer pipeline and the outlet gate for the sedimentation basin. Each flocculation basin can also be isolated and drained independently from the sedimentation basins by closing an inlet valve and outlet gate.

## Sedimentation

The sedimentation process for Stage 1 includes horizontal-flow rectangular sedimentation basins with flight and chain sludge collectors. Four parallel basins will be provided, each sized for a surface loading rate of 0.5 gpm/sft, and hydraulic detention time of 3.3 hours. Full-scale demonstration testing will be required to support rerating the sedimentation basins at potential loading rates of up to 1.0 gpm/sft. In Stage 2, the four sedimentation basins will either be uprated based on successful full-scale demonstration testing at higher loading rates, or retrofitted with inclined plate settlers at the outlet end of the basins. The plate settlers will be designed for a maximum plate loading rate of 1.0 gpm/sft. This equates to a surface overflow rate or projected (planimetric) loading rate of approximately 3.0 gpm/sft.

A flight and chain mechanical sludge collection system will be installed in Stage 1 and will be retained for the Stage 2 capacity expansion. A cross-collector channel and sludge hoppers will be located within the sedimentation basins for sludge storage and transfer by gravity to the residuals facility. Use of a dual sludge collection system at the inlet and outlet ends of the sedimentation basins will allow additional flocculation basins to be built on the inlet side of the basins, if required for increasing flocculation detention time.

## Intermediate Ozonation

The process design criteria for intermediate ozonation was determined based on bench-scale results of ozone demand and decay testing of Potomac River water. An Ozone CT Analysis Model was used to select the optimal combination of ozone dose and hydraulic detention time to meet primary disinfection targets for *Giardia* and virus inactivation. The analysis determined that two contact basins sized for a hydraulic detention time (HDT) of five minutes will meet the 1-log *Giardia* and 2-log virus disinfection targets for both summer and winter design conditions at a reasonable ozone dose ( $< 2 \text{ mg/L}$ ). Each contactor will be designed for a longer contact time (10 minutes at future 42 mgd) and will include two passes to allow additional time for the ozone residual to decay below detection limits in cold water, thereby minimizing the need for ozone quenching. Ozone will be introduced into each contactor using a pumped sidestream injection and nozzle manifold dissolution system.

Post-ozone treatment chemicals will be added in a chemical mixing chamber near the outlet of each ozone contactor train using a pumped injection mixing system. An ozone sample gallery is located along the west side of the contacting basins, including five ozone residual sample stations for each train.



A high concentration, oxygen-fed ozone generation system will be implemented to serve both the pre-ozone and intermediate ozone application points. Ozone generation equipment for both preozonation and intermediate ozonation, and ozone dissolution and offgas destruct equipment for intermediate ozonation, are centrally located in the Operations building adjacent to the intermediate ozone contacting basins.

## Biological Filtration

The filtration system for the LWTP is a dual-media gravity filter consisting of 48 inches of granular activated carbon (GAC) over 12 inches of sand and six inches of torpedo sand. Other filter components include: (1) gravel-less nozzle/plenum underdrain system, (2) constant rate/constant head filter control system using an effluent flow control valve and flow meter on each filter, (3) standard fiberglass washwater troughs, (4) electric valve actuators, (5) direct pumped filter backwash system with auxiliary air scour using chloraminated water from the finished water clearwell, and (6) filter-to-waste piping system sized for the same capacity as the filter outlet piping.

For Stage 1, the filters will be rated at 3.8 gpm/sft with one filter offline, slightly below the VDH criterion for high-rate filtration of 4.0 gpm/sft. A total of six filters will be provided, each sized to treat 4.2 mgd with five filters operating at an empty bed contact time (EBCT) of 7.8 minutes. For the Stage 2 capacity expansion, additional filters will be required to meet higher filter loading rates (up to 6 gpm/sft), subject to approval by VDH based on results of full-scale demonstration testing to be performed prior to the expansion. The capability to add hydrogen peroxide to the filter-applied water at a design dose of 1 mg/L will be provided to control head loss accumulation rates across the filters during the summer months when biological activity in the filter beds is maximized.

## UV Disinfection

A post-filter UV system, using medium-pressure (MP) reactors will be planned for possible future implementation as a bid alternate, with the reactors located in the Filter/UV Pipe Gallery of the Filter Building. The UV system will be designed to comply with requirements of USEPA's UV Disinfection Guidance Manual (UVDGM), including off-site validation testing to be completed by the selected UV equipment vendor to determine the reduction equivalent dose (RED) for 3-log *Cryptosporidium* inactivation. Two UV reactors would be provided in Stage 1, each rated at a design flow of 21 mgd or 100% of the Stage 1 design flow. One additional UV reactor would be provided in Stage 2, for a total of three, each rated at 21 mgd or 50% of the Stage 2 design flow.

A preliminary UV transmittance (UVT) design value of 88% was selected for sizing the post-filter UV system based on the 5<sup>th</sup> percentile of a settled water UVT dataset developed by Fairfax Water for the Corbalis WTP.

## Clearwells

Clearwells provide finished water storage for: (1) supplying peak water demand rates in excess of production rates, (2) supplying washwater for filter backwashing, (3) providing sufficient contact time for primary disinfection (as a back-up to the ozone system), and (4) providing emergency storage to account for plant downtime. To meet the storage needs of the plant, one 2.75 mg circular prestressed concrete cylinder (CPCC) tank will be constructed in Stage 1 for 20 mgd.

The clearwell will include the following features: (1) capability for tank dewatering, (2) sloped roof for drainage, (3) internal baffling, security vents, overflow chambers, access hatches, and (4) exterior finishes to improve tank aesthetics.

## Finished Water Pumping Station and Transmission

The Finished Water Pumping Station is sized for the Stage 2 design flow (40 mgd net), with pumping equipment installed for Stage 1 (20 mgd net). For Stage 1, three vertical turbine can pumps are provided for finished water pumping, each rated at 10 mgd (6,950 gpm) at 360 feet of head with 800 HP motors and variable frequency drives. The Stage 1 operating range of the pumping station is 4 to 20 mgd, assuming two duty pumps and one standby pump. In addition, three backwash pumps will be provided for filter backwashing operations. The backwash pumps will deliver a high backwash rate of 24.0 mgd and a low rate of 5.5 mgd, assuming two duty and one standby pump.

The overall pump station facility layout includes the Finished Water Pumping Station, Electrical Room, and Standby Generator Room in a linear building arrangement. The pumping station will incorporate an overhead bridge crane with coverage to serve the all finished water pumps and backwash pumps.

A finished water transmission (FWT) main sized at 42 inches in diameter is to be routed from the finished water pumping station to Belmont Ridge Road (Route 659) and will include a tunnel under Goose Creek. The 30-foot minimum easement for the finished water main will accommodate the 42-inch finished water main and a potential 8-inch sanitary force main.

## Chemical Storage and Application

The water treatment chemicals for the ozone-biofiltration process train for the LWTP (excluding liquid oxygen which is considered a component of the ozone unit process) include: (1) sodium hydroxide and sulfuric acid for pH adjustment (2) polyaluminum chloride (PACL) and coagulant aid polymer (CAP) for coagulation; (3) PACL and filter aid polymer (FAP) for filter optimization (particle removal); (4) hydrofluosilicic acid for dental hygiene; (5) orthophosphate for corrosion control; (6) sodium hypochlorite and ammonium hydroxide for chloramination; (7) hydrogen peroxide for improved filtration (extended filter runs) and ozone quenching; (8) calcium thiosulfate (CATs) for de-chlorination; and (9) solids thickening polymer for residuals thickening.

Most chemicals, with the exception of polymer totes, will be delivered as liquids by tanker trucks and off-loaded by pumping into bulk storage tanks. All liquid chemicals will be stored in the Chemical Building in separated containment areas equipped with storage tanks and feed pumps.

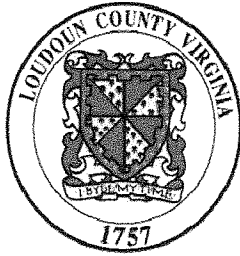
The primary chemical application points for the LWTP are located throughout the water treatment facility and include: (1) preozone flash reactor and pipeline contactor for ozone and pH adjustment chemicals; (2) first-stage pumped injection rapid mixer for PACL and CAP; (3) second-stage mechanical rapid mixer for PAC, CAP, and pH adjustment chemicals; (4) intermediate ozone nozzle manifold and contactor for ozone; (5) post-ozone pumped injection system for PACL, FAP, and hydrogen peroxide; (6) post-filter pumped injection system for sodium hypochlorite; (7) filter control weir for ammonia; and (8) post-clearwell pumped injection for fluoride and orthophosphate. Each application point will be provided with a pumped, mechanical or hydraulic mixing device to provide fully turbulent, homogenous mixing to minimize chemical consumption and optimize treatment performance.



## Solids Handling

Dry solids production for the LWTP was estimated based on raw water turbidity trends for the Leesburg WTP and coagulant and polymer doses for Fairfax Water's Corbalis WTP for the period 2007 through 2009. The impact of the future quarry supply on reducing plant solids production during turbidity excursion events in the Potomac River was also evaluated. Based on this analysis, a 95th percentile solids production rate of 7,043 dry lb/day—which accounts for use of the quarry supply when Potomac River turbidity exceeds 50 NTU—is recommended for sizing the Stage 1 residuals treatment processes. The discharge rates for several liquid solids waste streams for Stage 1 were estimated as follows: (1) spent filter backwash water (SFBW)—1.8 mgd (2) filter-to-waste—0.26 mgd, (3) sedimentation basin blowdown—0.28 mgd.

The recommended residuals facility design for Stage 1 includes equalization, clarification and thickening of SFBW and gravity thickening of sedimentation basin residuals. Thickened solids will be removed from site by a truck hauling contractor for off-site disposal. The 42 mgd expansion of the residuals handling facilities (Stage 2) will include the additional SFBW clarification capacity, new thickeners and a new mechanical dewatering facility.



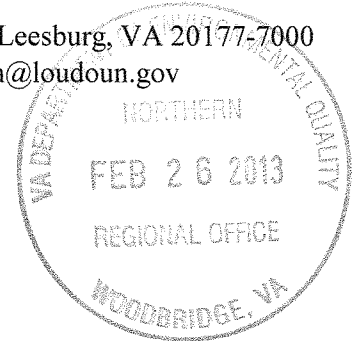
Loudoun County, Virginia

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Office of the County Administrator

1 Harrison Street, S.E., MSC #2, 5th Floor, P.O. Box 7000, Leesburg, VA 20177-7000

Telephone (703) 777-0200 • Fax (703) 777-0325 • coadmin@loudoun.gov



February 20, 2013

To Whom It May Concern:

The following information is an addendum to the Potomac Water Supply Program, Loudoun Water Treatment Plant VPDES Permit Application – Local Government Ordinance Form:

As noted, the proposed location and operation of the water treatment plant will comply with all local ordinances adopted pursuant to Chapter 22 of Title 15.2 of the Code of Virginia, subject to SPEX 2009-0021, SPMI 2009-0006 and CMPT 2009-0007 approved by the Board of Supervisors on January 4, 2011 and the associated Conditions of Approval.

In addition to all of the water treatment plant special exception conditions, the following 2 proffers associated with rezoning the property to MR-HI, ZMAP-2009-0004, apply to the water treatment plant, these were also approved by the Board of Supervisors on January 4, 2011:

I. LAND USE AND ENVIRONMENTAL      3. No Build Buffer

The land within the area depicted on Sheets 3, 5, and 6, of the Rezoning Plat as “300’ No Build Buffer per Comp. Plan” along Goose Creek shall be retained as open space as a “no-build” buffer area. No surface land development activities shall be permitted in this buffer area except for (1) activities necessary to the maintenance of the Goose Creek and Goose Creek Reservoir, (2) forest/tree maintenance in accordance with forestry and silviculture practices approved by the County Urban Forester, (3) disturbance necessary to meet Facilities Standards Manual standards for adequate out-fall, 4 ) travelways that are needed for the conduct of such forest/tree maintenance, and Goose Creek and Goose Creek Reservoir maintenance, and (5) a public access easement with a future trail to be constructed by others.

II. TRANSPORTATION      4. Gant Lane

The Applicants shall dedicate, by Deed approved by the County Attorney and at no public cost, sufficient right-of-way to accommodate a turnaround in accordance with VDOT standards at the terminus of Gant Lane (Route 652),

generally as shown on the Rezoning Plat prior to the approval of the first site plan on the Subject Property.

Be further advised that Loudoun Water submitted the construction plans for this proposal to the County on February 4, 2013 (STPL-2013-0003, "Luck Stone and Loudoun Water"). The plans are currently under review by staff.

If you have any questions or require additional information, please contact Charles Yudd, Assistant County Administrator at (703) 777-0200.

Regards,



Tim Hemstreet  
County Administrator

Attachments:

1. SPEX-2009-0021, SPMI-2009-0006, CMPT-2009-0007 Copy Tests, dated January 4, 2011
2. ZMAP-2009-0004 Copy Tests, dated January 4, 2011
3. SPEX-2009-0021 Conditions, dated December 13, 2010
4. ZMAP-2009-0004 Proffer Statement

Cc: Charles Yudd, Assistant County Administrator



**Local Government Ordinance Form**

SUBJECT: Local and Areawide Planning Requirements

TO: Applicants For A Virginia Pollutant Discharge Elimination System Permit

§62.1-44.15:3 A of the State Water Control Law states:

*"No application for a new individual VPDES permit authorizing a new discharge of sewage, industrial wastes, or other wastes shall be considered complete unless it contains notification from the county, city, or town in which the discharge is to take place that the location and operation of the discharging facility are consistent with applicable ordinances adopted pursuant to Chapter 22 (§ 15.2-2200 et seq.) of Title 15.2, Code of Virginia. The county, city or town shall inform in writing the applicant and the Board of the discharging facility's compliance or noncompliance not more than thirty days from receipt by the chief administrative officer, or his agent, of a request from the applicant. Should the county, city or town fail to provide such written notification within thirty days, the requirement for such notification is waived. The provisions of this subsection shall not apply to any discharge for which a valid VPDES permit had been issued prior to March 10, 2000."*

In accordance with this section, applications for a new VPDES permit will not be considered complete until the certification statement is submitted to the Department of Environmental Quality Regional Office. Applicants may use the bottom of this page to transmit the request to the locality. If the locality does not respond to your request within 30 days, submit a copy of this form, showing the date you made the request, with your permit application.

\*\*\*\*\*

To: Tim Hemstreet, Loudoun County Administrator  
(County, City, or Town Administrator/Manager)

Date: 1/16/13

I am in the process of completing an application for a new VPDES permit. In accordance with Chapter 22 (§15.2-2200 et seq.) of Title 15.2 of the Code, I request that you sign one of the three statements certifying that the operation described on the attached permit application is or is not consistent with your local ordinances. Please return this form to me at:

(Applicant's address): 44865 Loudoun Water Way  
P.O. Box 4000  
Ashburn, VA 20146

**PLEASE SEE THE REVERSE SIDE OF FORM FOR CERTIFICATION REQUIREMENTS**

LOCAL GOVERNMENT ORDINANCE FORM

For new VPDES permit applications

In reference to the request from: Loudoun Water  
Applicant's Name

For certification of a discharge at:

Loudoun Water Treatment Plant  
Name and Location of Facility

I hereby certify,

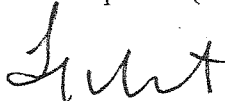
☒ (1) That the proposed location, and operation of the facility is consistent with all ordinances adopted pursuant to Chapter 22 (§15.2-2200 et seq.) of Title 15.2 of the Code of Virginia

OR

☐ (2) That no local ordinances are in effect pursuant to Chapter 22 (§15.2-2200 et seq.) of Title 15.2 of the Code of Virginia

OR

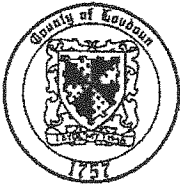
☐ (3) That the proposed location and operation of the facility is **not** consistent with all ordinances adopted pursuant to Chapter 22 (§15.2-2200 et seq.) of Title 15.2 of the Code of Virginia

  
Signature

Tim Hemstreet  
Printed Name

County Administrator  
Title

February 20, 2013  
Date



Loudoun County, Virginia

[www.loudoun.gov](http://www.loudoun.gov)

Office of the County Administrator

1 Harrison Street, S.E., 5th Floor, P.O. Box 7000, Leesburg, VA 20177-7000

Telephone (703) 777-0200 • Fax (703) 777-0325

At a business meeting of the Board of Supervisors of Loudoun County, Virginia, held in the County Government Center, Board of Supervisors' Meeting Room, 1 Harrison St., S.E., Leesburg, Virginia, on Tuesday, January 4, 2011 at 9:00 a.m.

IN RE: SPEX 2009-0021, SPMI 2009-0006, AND CMPT 2009-0007 /LOUDOUN WATER – WATER TREATMENT PLANT

Mrs. Kurtz moved that the Board of Supervisors ratify CMPT 2009-0007, Loudoun Water – Water Treatment Plant, based on the Findings (Attachment 2).

Mrs. Kurtz moved that the Board of Supervisors approve SPEX 2009-0021 and SPMI 2009-0006, Loudoun Water – Water Treatment Plant, subject to the Conditions of Approval dated December 13, 2010, and based on the Findings.

Seconded by Mr. Miller.

Mrs. Kurtz accepted Mr. Burton's friendly amendment to include the following language in the conditions: "Drinking water processed at the Water Treatment Plant shall be distributed within the Central Water Supply System, which is limited by the policies of the Loudoun County Revised General Plan to the Suburban Policy Area and Transition Policy Area, or to areas designated by the Loudoun County Board of Supervisors. Any other extension of drinking water lines from the Water Treatment Plant shall require Commission Permit approval or shall otherwise be approved by the Board of Supervisors. This condition shall not restrict emergency interconnections between Loudoun Water, City of Fairfax, Fairfax Water and the Town of Leesburg systems."

Seconded by Mr. Miller.

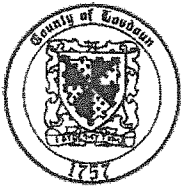
Voting on the Motion, As Amended: Supervisors Buckley, Burk, Burton, Delgaudio, Kurtz, McGimsey, Miller, Waters, and York – Yes; None – No.

A COPY TESTE:

  
DEPUTY CLERK FOR THE LOUDOUN  
COUNTY BOARD OF SUPERVISORS

<sup>1111</sup> SPEX 2009-0021, SPMI 2009-0006, AND CMPT 2009-0007 /LOUDOUN WATER – WATER TREATMENT PLANT)  
(Documents associated with this application are filed in the Planning Department's folders - SPEX 2009-0021, SPMI 2009-0006, AND CMPT 2009-0007 /LOUDOUN WATER – WATER TREATMENT PLANT)





Loudoun County, Virginia

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Telephone (703) 777-0200 • Fax (703) 777-0325

At a business meeting of the Board of Supervisors of Loudoun County, Virginia, held in the County Government Center, Board of Supervisors' Meeting Room, 1 Harrison St., S.E., Leesburg, Virginia, on Tuesday, January 4, 2011 at 9:00 a.m.

IN RE: ZMAP 2009-0003 LUCK STONE, ZMAP 2009-0004 LUCK STONE AND LOUDOUN WATER, ZMAP 2010-0006, EXPANSION ON ZONING DISTRICT, AND SPEX 2009-0027, LUCK STONE QUARRY D EXPANSION

Mr. Miller moved that the Board of Supervisors approve ZMAP 2010-0006, Expansion Of The Quarry Notification Overlay District for Luck Stone Quarry "D"; with the Map #2010-219 dated September 16, 2010, and ZMAP 2009-0004, Luck Stone and Loudoun Water, and ZMAP 2009-0003, Luck Stone, and SPEX 2009-0027, Luck Stone Quarry, subject to the Proffer Statements dated December 14, 2010; the Conditions of Approval dated December 13, 2010; and based upon the Findings for Approval in Attachment 3.

Seconded by Mrs. Kurtz.

Voting on the Motion: Supervisors Buckley, Burk, Burton, Delgaudio, Kurtz, McGimsey, Miller, Waters, and York – Yes; None – No.

A COPY TESTE:

DEPUTY CLERK FOR THE LOUDOUN  
COUNTY BOARD OF SUPERVISORS

(9-ZMAP 2009-0003 LUCK STONE, ZMAP 2009-0004 LUCK STONE AND LOUDOUN WATER, ZMAP 2010-0006, EXPANSION ON ZONING DISTRICT, AND SPEX 2009-0027, LUCK STONE QUARRY D EXPANSION)

(Documents associated with this application are filed in the Planning Department's folders -ZMAP 2009-0003 LUCK STONE, ZMAP 2009-0004 LUCK STONE AND LOUDOUN WATER, ZMAP 2010-0006, EXPANSION ON ZONING DISTRICT, AND SPEX 2009-0027, LUCK STONE QUARRY D EXPANSION)

## CONDITIONS OF APPROVAL - FINAL

### SPEX 2009-0021, Loudoun Water – Water Treatment Plant, Conditions of Approval (December 13, 2010)

1. Substantial Conformance. The development of the Special Exception Use, a Water Treatment Plant in the MR-HI (Mineral Resource – Heavy Industry) zoning district, shall be in substantial conformance with these conditions, with the General Notes on Sheet 1, with the Property/SPEX boundary line (enclosing the un-shaded area shown as “Possible Future Parcel A-2”) and the private access road that extends from Gant Lane to the Water Treatment Plant Property, both as shown on Sheets 3 and 4, with the limits of disturbance (LOD) lines depicted on Sheets 3, 4, 6, and 8, and with the Zoning Requirements/Proposed Modifications listed on Sheet 5, with Sheets 1, 3, 4, 5, 6, and 8 being part of the plan set entitled “Loudoun Water Central Water Supply Program Parcel A-2 (A Portion of Former Parcel 15) Water Treatment Plant” consisting of eight (8) sheets numbered as 1 through 8, dated APRIL, 2009, as revised through 10-04-10, and prepared by Urban, Ltd. (the “SPEX Plat”). Approval of this application for the portion of Tax Map # /61////////15/ (PIN # 153-35-5865) lying within the “PROP. PROPERTY/SPEX LINE” as delineated and labeled on the SPEX Plat (the “Property”) shall not relieve the Applicant or the owners of the Property from the obligation to comply with and conform to any other Zoning Ordinance, Codified Ordinance, or applicable regulatory requirement. As used in these conditions, the term “Applicant” includes the owner of the Property subject to this Special Exception approval, its successors, and parties developing, establishing or operating the approved Special Exception Use.
2. Period of Validity. Pursuant to Section 6-1313(A) of the Revised 1993 Loudoun County Zoning Ordinance (“Zoning Ordinance”) the period of validity within which the approved Special Exception use must commence shall be ten (10) years from the date of approval of this Special Exception application by the County. Except as modified by this change in time period, all other provisions of Section 6-1313(A) of the Zoning Ordinance shall continue to apply as provided therein.
3. Construction Traffic. Prior to issuance of a grading permit for the Special Exception use on the Property, the Applicant shall submit a request to VDOT for approval of construction vehicle access via the existing Gant Lane (Route 652) crossing of Sycolin Creek. If VDOT determines that safe and adequate construction vehicle access to the Property cannot be provided via the existing Gant Lane (Route 652) crossing of Sycolin Creek, then an alternative construction vehicle access road shall be open to traffic prior to issuance of a grading permit for the Special Exception use on the Property, and all construction traffic associated with the Special Exception use shall access the Property by means of such alternative access road.
4. Turnaround at the Terminus of Gant Lane. The Applicant shall construct a standard cul-de-sac turn-around at the existing terminus of Gant Lane (Route 652), as generally depicted on the SPEX Plat and in accordance with VDOT regulations. Such turn-around shall be open for use prior to occupancy of the Water Treatment Plant.

5. Permanent Access. If not previously constructed pursuant to condition #3, then prior to the issuance of the first occupancy permit for the Water Treatment Plant a new permanent access road and Sycolin Creek bridge crossing shall be constructed to FSM standards for a Category C Private Street and open for use.
6. Tree Save Area and 300-foot No Build Buffer. Within the tree save area labeled as "Tree Save Area" as depicted on Sheets 4 and 6 of the SPEX Plat, and within the 300-foot No Build Buffer as depicted on Sheets 3, 4, 6, and 8 of the SPEX Plat as "300' NO BUILD BUFFER PER COMP. PLAN" the Applicant shall preserve a minimum of eighty percent (80%) of the existing canopy, exclusive of stands of Virginia Pine over twenty-five (25) years in age. A maximum of twenty percent (20%) of the existing canopy may be removed to the extent necessary for the following land-disturbing activities, which shall be the only activities permitted within such areas unless otherwise provided herein:
  - a. Forest management techniques pursuant to these conditions of approval,
  - b. Pervious natural trails and trail connections,
  - c. Stream and wetland mitigation activities,
  - d. Maintenance of the Goose Creek and its reservoir,
  - e. Travelways that are needed for the conduct of forest management, stream and wetland mitigation activities, and
  - f. Disturbance necessary to meet FSM standards for adequate outfall.

Additionally, between the limits of disturbance, labeled as "LOD" and as delineated on the SPEX Plat, and the eastern Property line, subsurface utilities will be permitted. For the purpose of these conditions of approval, subsurface utilities are defined as utilities that are located underground and that the installation or construction of which does not disturb the existing trees, vegetation, steep slopes, and other environmental features on the surface of the ground.

If, during construction on the Property, it is determined by the Applicant's certified arborist or the County that any healthy tree located within the Tree Save area has been damaged by construction activities and shall not survive, then, the Applicant shall remove each such tree and replace each such tree with two (2) 2½ - 3 inch caliper native, non-invasive deciduous trees. The placement of the replacement trees shall be proximate to the area of each such damaged tree so removed or in another area as requested by the County.

7. Forest Management Techniques. Forest Management Techniques, performed by or recommended by a professional forester or certified arborist, that are necessary to protect or enhance the viability of the canopy may be undertaken within the "Tree Save Area as labeled and as delineated on the SPEX Plat. Such Management Techniques may include, without limitation, pruning and the removal of vines, invasive species, trees uprooted or damaged by extreme weather conditions, and trees or limbs that are diseased, insect-infested, dead, or are considered a hazard to life or Property.
8. Reforestation along Western Property Boundary. In the event that land disturbing activities occur within the Limits of Disturbance ("LOD") along the western boundary of the Property and any such disturbance is within the "EXISTING TREE LINE", as labeled and delineated on Sheet 4 of the SPEX Plat, the Applicant shall provide reforestation within the disturbed



area extending eastward for a minimum depth of twenty (20) feet as measured from the western edge of the mapped wetlands that will not be subject to mitigation measures. Such buffer shall be planted with three (3) gallon minimum size trees of a species selected in consultation with the County Urban Forester and at a density acceptable to the County Urban Forester, but no closer than ten (10) feet on center and subject to a ten (10) foot separation being maintained between plantings and the security fence located around the perimeter of the Water Treatment Plant.

9. Raw Water Line. The raw water line that conveys raw water from the Potomac River intake or water banking sites to the Property shall be located within the limits of disturbance (the "LOD" as labeled and delineated on the SPEX Plat) and shall not be located within the area labeled and delineated on the SPEX Plat as "Tree Save Area".
10. Low Impact Development. The Applicant shall incorporate Low Impact Development (LID) techniques into the development of the Water Treatment Plant. The specific LID features shall be identified prior to the first site plan approval.
11. Stormwater Management. Post-construction stormwater management shall prevent the post-development peak discharge rate and volume from exceeding the pre-development peak discharge rate and volume for the 1- and 2- year, 24-hour design storms.
12. Erosion and Sediment Control and Turbidity Management. In addition to the minimum requirements for erosion and sediment control in Chapter 1220 of the Codified Ordinance and the Virginia Erosion and Sediment Control Handbook, the Applicant shall provide the following more protective erosion and sediment control measure specified in the FSM for Reservoir Protection Requirements: The use of stabilization matting shall be expanded to aid in the establishment of vegetation.
13. Trail Along Goose Creek. At such time that an off-site trail easement is dedicated to the County to connect to the northern boundary of the Property, the Applicant shall dedicate to the County, at no cost to the County, a fourteen (14) foot wide public access easement within the "300' NO BUILD BUFFER PER COMP. PLAN" as labeled and delineated on the SPEX Plat. The Applicant shall field locate such easement in consultation with Loudoun County Parks, Recreation and Community Services (PRCS) Staff. Such easement shall extend from the northern boundary of the Property to the southern boundary, provided, however, that such easement shall not be inconsistent with or interfere with the use of the finished water line labeled on the SPEX Plat as "APPROXIMATE LOCATION OF UNDERGROUND FINISHED WATERLINE" or the Dulles Greenway (Route 267) maintenance easement labeled on the SPEX Plat as "EX. SLOPE AND MAINTENCE [sic] EASEMENT D.B. 1255 PG. 1943".
14. Lighting. All exterior lighting, including security lighting, shall be designed and installed to minimize light trespass and the visibility of lighting from properties offsite of the Property. Exterior light fixtures shall be full cutoff and fully shielded and shall direct light downwards and into the interior of the Property and away from surrounding public roads and properties.

15. Building and Roof Materials. The exterior of all buildings within the "PROP. PROPERTY/SPEX LINE" as delineated and labeled on the SPEX Plat shall be constructed of materials and roofing systems selected from the following options:

- a. Exterior Building Materials: face brick; cast stone; natural limestone or granite (usually as an accent); split-faced or ground-faced concrete masonry units; precast concrete panels that can also mimic other surfaces such as brick, stone, or wood; and flat or engineered insulated metal panels that can mimic other surfaces such as wood siding, and
- b. Roof Systems and Materials:
  - i. Flat roof systems using a black or reflective color, or
  - ii. Sloping roof systems using prefinished metal standing seam, natural slate, clay tile, or composition shingles.

***16. Drinking water processed at the Water Treatment Plant shall be distributed within the Central Water Supply System, which is limited by the policies of the Loudoun County Revised General Plan to the Suburban Policy Area and Transition Policy Area, or to areas designated by the Loudoun County Board of Supervisors. Any other extension of drinking water lines from the Water Treatment Plant shall require Commission Permit approval or shall otherwise be approved by the Board of Supervisors. This condition shall not restrict emergency interconnections between Loudoun Water, City of Fairfax, Fairfax Water, and the Town of Leesburg systems. [added by the Board of Supervisors prior at the 01-04-2011 Business Meeting]***

**SPMI 2009-0006, Loudoun Water – Water Treatment Plant, Conditions of Approval**  
(December 13, 2010)

1. Substantial Conformance. The approved Minor Special Exception modifies Section 5-621(B) and Table 5-1414(B) of Section 5-1414(B) of the Revised 1993 Zoning Ordinance by modifying the requirements for the Type 4 Buffer Yard along the western, northern, and eastern Property boundaries as follows: (a) Eliminates the required plantings per 100 lineal feet of property line (canopy trees, understory trees, shrubs, and evergreen trees) and permits the existing vegetation to provide buffering and screening; (b) Eliminates the required twenty-five (25) foot minimum width and thirty (30) foot maximum width; and (c) Permits a ten (10) foot high chain link fence in lieu of a six (6) foot high fence, wall, or berm providing a minimum of ninety-five percent (95%) opacity. Such approved modifications shall apply to the portion of Tax Map # /61////////15/ (PIN # 153-35-5865) lying within the "PROP. PROPERTY/SPEX LINE" (the "Property") as delineated and labeled on Sheets 3, 4, and 8 of the SPEX Plat (as defined below) and development pursuant to such modifications shall be in substantial conformance with the "PROPOSED MODIFICATIONS]" listed on Sheet 5 of the Special Exception Plat, entitled "Loudoun Water Central Water Supply Program Parcel A-2 (A Portion of Former Parcel 15) Water Treatment Plant" consisting of eight (8) sheets numbered as 1 through 8, dated APRIL, 2009, as revised through 10-04-10, and prepared by Urban, Ltd. (the "SPEX Plat").

2. Buffer along Dulles Greenway. The approved modifications of Sections 5-621(B) and Table 5-1414(B)(4) of Section 5-1414(B), as identified in Condition #1, shall not apply to the Property line adjacent to the Dulles Greenway (Route 267).



**PROFFER STATEMENT**  
**LOUDOUN WATER and LUCK STONE CORPORATION**  
**ZMAP 2009-0004**

**May 5, 2010**  
**August 10, 2010**  
**August 26, 2010**  
**October 4, 2010**  
**November 2, 2010**  
**December 10, 2010**  
**December 14, 2010**

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Loudoun County Sanitation Authority d/b/a Loudoun Water, a Virginia body politic and corporate, Owner and Co-Applicant, together with Luck Stone Corporation, a Virginia corporation, Co-Applicant and Contract Purchaser in part, (together hereinafter, the "Applicants"), of certain property depicted on Sheet 3 of 9 of the Rezoning Plat (identified below), and described as being a portion of Loudoun County Tax Map 61, Parcel 15 (PIN #153-35-5865), (hereinafter the "Subject Property"), hereby voluntarily proffer, pursuant to Section 15.2-2303 of the Code of Virginia (1950), as amended, and Section 6-1200 of the Revised 1993 Loudoun County Zoning Ordinance, (hereinafter referred to as "Zoning Ordinance"), as amended, that in the event the Subject Property is rezoned by the Loudoun County Board of Supervisors to the Mineral Resources-Heavy Industry ("MR-HI") Zoning District and as shown on the Plan Set (identified below), the development of the Subject Property will be in substantial conformance with the following proffered terms and conditions.

**I. LAND USE AND ENVIRONMENTAL**

**1. Rezoning Plat**

The development of the Subject Property shall be in substantial conformance with the Rezoning Plat (the "Rezoning Plat") identified as sheets 1 and 3 through 6 of the Plan Set titled "Rezoning Loudoun Water and Luck Stone

Parcel A (Formerly Parcel 15)", dated April, 2009, and revised through October 4, 2010 prepared by Urban Ltd.

## 2. Land Uses

The uses permitted on the Subject Property shall be limited to only the following permitted uses, as identified in Section 3-1003 of the Zoning Ordinance: "Agriculture, horticulture, forestry, or fishery," "Excavation, mining, dredging, stripping," "Park," "Water pumping station," "Crushing, treating, washing, and/or processing of materials, accessory to a quarry operation, when conducted on the same property," "telecommunications antenna", "telecommunications monopole", "telecommunications tower", and "Sewer pumping station", and only the following special exception uses, as identified in Section 3-1004 of the Zoning Ordinance, provided that approval of the requisite special exception is obtained in accordance with the Zoning Ordinance: "Crushing, treating, washing, and/or processing of materials," "Stone Quarrying", telecommunications monopole", "telecommunications tower", "Water treatment plant," and "Water storage tank," including any accessory uses to these permitted and special exception uses. Post excavation phase accessory and required reclamation uses, such as water impoundment and those uses approved by the Virginia Department of Mines, Minerals, and Energy ("DMME"), shall also be allowed provided such uses are permitted under the Zoning Ordinance. The above uses may be located anywhere within the portion of the Subject Property labeled "MR-HI Uses," consistent with the Rezoning Plat and any applicable Special Exception Plat. This proffer is not intended to restrict uses which are otherwise exempt from the application of the Zoning Ordinance (such as, for example, utility uses such as underground water lines and sewer lines).

## 3. No Build Buffer

The land within the area depicted on Sheets 3, 5, and 6, of the Rezoning Plat as "300' No Build Buffer per Comp. Plan" along Goose Creek shall be retained as open space as a "no-build" buffer area. No surface land development activities shall be permitted in this buffer area except for (1) activities necessary to the maintenance of the Goose Creek and Goose Creek Reservoir, (2) forest/tree maintenance in accordance with forestry and silviculture practices approved by the County Urban Forester, (3) disturbance necessary to meet Facilities Standards Manual standards for adequate out-fall, 4) travelways that are needed for the conduct of such forest/tree maintenance, and Goose Creek and Goose Creek Reservoir maintenance, and (5) a public access easement with a future trail to be constructed by others.

## **II. TRANSPORTATION**

### **4. Gant Lane**

The Applicants shall dedicate, by Deed approved by the County Attorney and at no public cost, sufficient right-of-way to accommodate a turnaround in accordance with VDOT standards at the terminus of Gant Lane (Route 652), generally as shown on the Rezoning Plat prior to the approval of the first site plan on the Subject Property.

## **III. SIGNATORY AUTHORITY**

The undersigned parties hereby warrant that all of the owners of a legal interest in the Subject Property have signed this Proffer Statement, that no signature from any additional party is necessary for these Proffers to be binding and enforceable in accordance with their terms, that they, together with the others signing this document, possess full authority to bind the Subject Property to these conditions, and that the Proffers are entered into voluntarily.



[ SIGNATURE PAGES TO FOLLOW ON NEXT PAGE ]

**LUCK STONE CORPORATION**

**Contract Purchaser in Part of LCTM 61-15  
(MCPI #153-35-5865)**

**By: \_\_\_\_\_  
Name: Douglas D. R. Palmore  
Title: Vice President for Environmental Design  
and Development**

STATE OF \_\_\_\_\_  
COUNTY OF \_\_\_\_\_, to wit:

I, the undersigned Notary Public, in and for the jurisdiction aforesaid, do hereby certify that Douglas D. R. Palmore, as Vice President for Environmental Design and Development for Luck Stone Corporation, whose name is signed to the foregoing, appeared before me and personally acknowledged the same in my jurisdiction aforesaid.

GIVEN under my hand and seal this \_\_\_\_\_ day of \_\_\_\_\_, 2010.

My Commission Expires:

\_\_\_\_\_

\_\_\_\_\_  
Notary Public

Notary Registration # \_\_\_\_\_

**LOUDOUN COUNTY SANITATION  
AUTHORITY (d/b/a LOUDOUN WATER)  
Fee Simple Owner of LCTM 61-15 (MCPI #153-  
35-5865)**

**By:** \_\_\_\_\_  
**Name:** Dale C. Hammes  
**Title:** General Manager

STATE OF \_\_\_\_\_  
COUNTY OF \_\_\_\_\_, to wit:

I, the undersigned Notary Public, in and for the jurisdiction aforesaid, do hereby certify that Dale C. Hammes, General Manager of Loudoun County Sanitation Authority (d/b/a Loudoun Water), whose name is signed to the foregoing, appeared before me and personally acknowledged the same in my jurisdiction aforesaid.

GIVEN under my hand and seal this \_\_\_\_\_ day of \_\_\_\_\_, 2010.

My Commission Expires:

\_\_\_\_\_

Notary Public

Notary Registration # \_\_\_\_\_